WATTLE RESEARCH INSTITUTE
15 SEP 1958
UNIVERSITY OF NATAL, P.M.B.

AGRICULTURAL *Chemicals*

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Respiratory Devices
Phosphoric Acid
Pest Control at B & L
Handling Sales Orders
Pest Control in Philippines
Corrosion Prevention
Selective Weed Control
Aromatics in Fertilizer

AUGUST, 1958

BON AIR HOTEL, AUGUSTA, GEORGIA, OCTOBER 29-31, 1958

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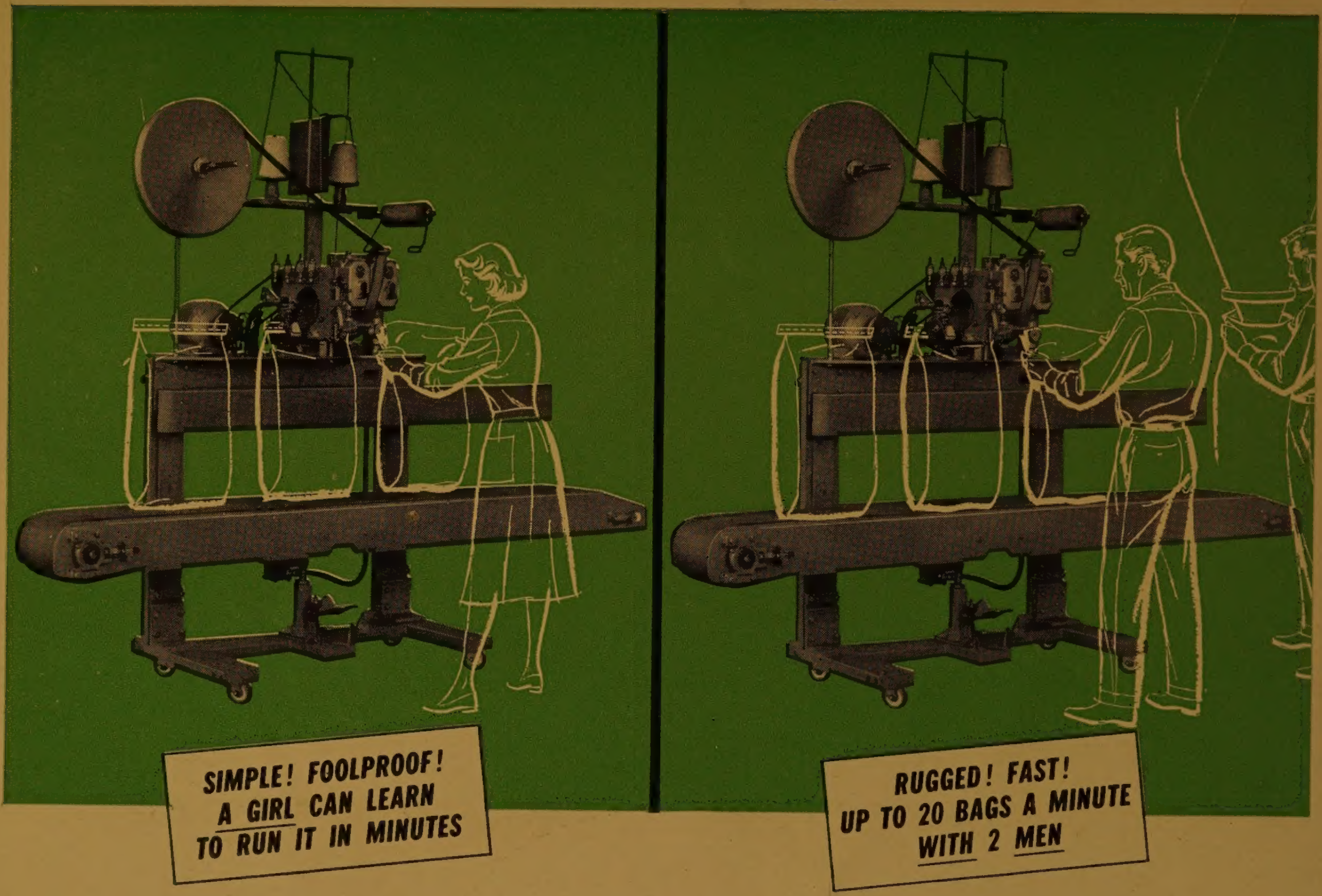
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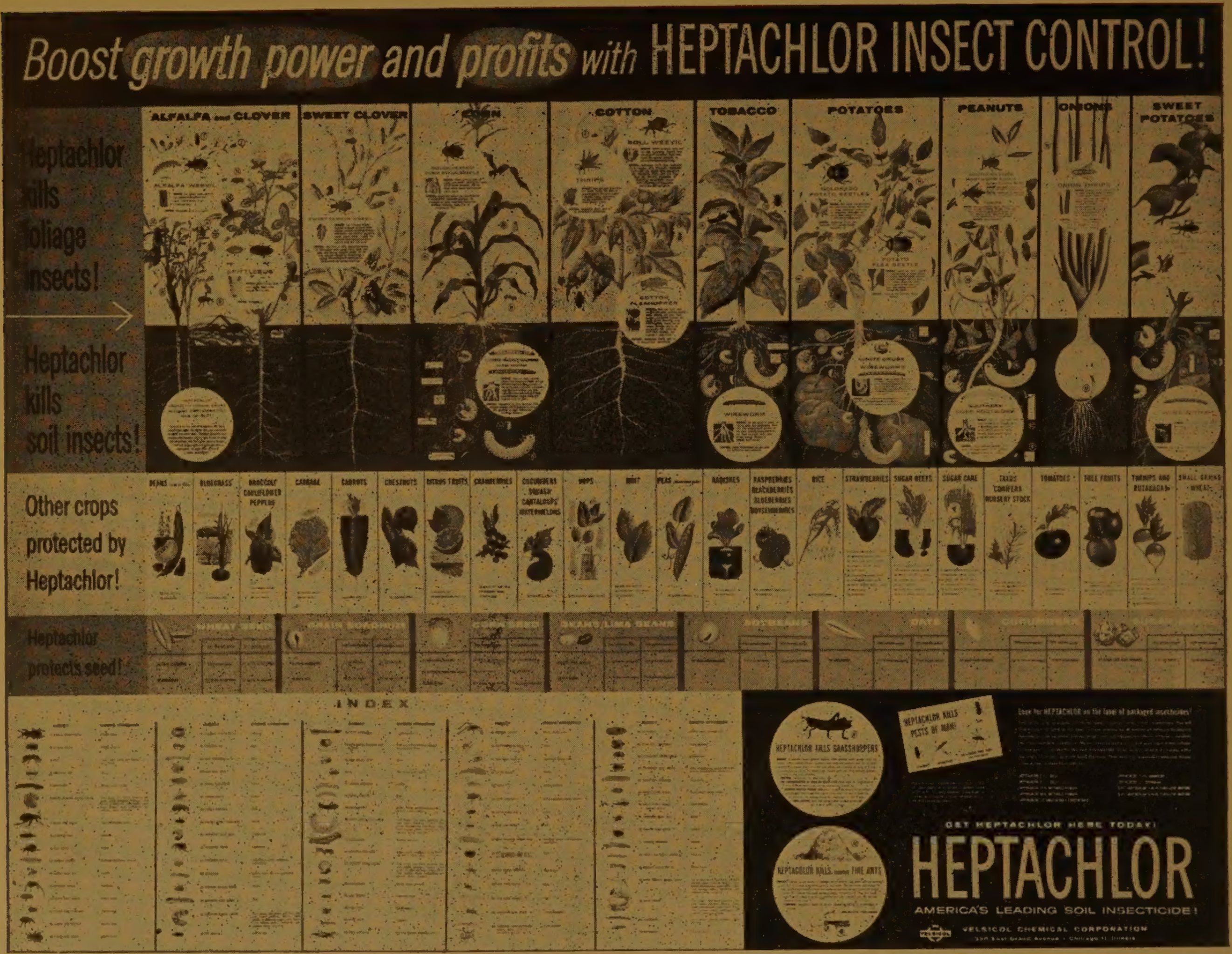
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This Month's Cover

The National Agricultural Chemical Association will hold its silver anniversary meeting at the Bon Air Hotel in Augusta, Georgia, October 29-31. See story and program, page 77.

Vol. 13, No. 8 **August, 1958**

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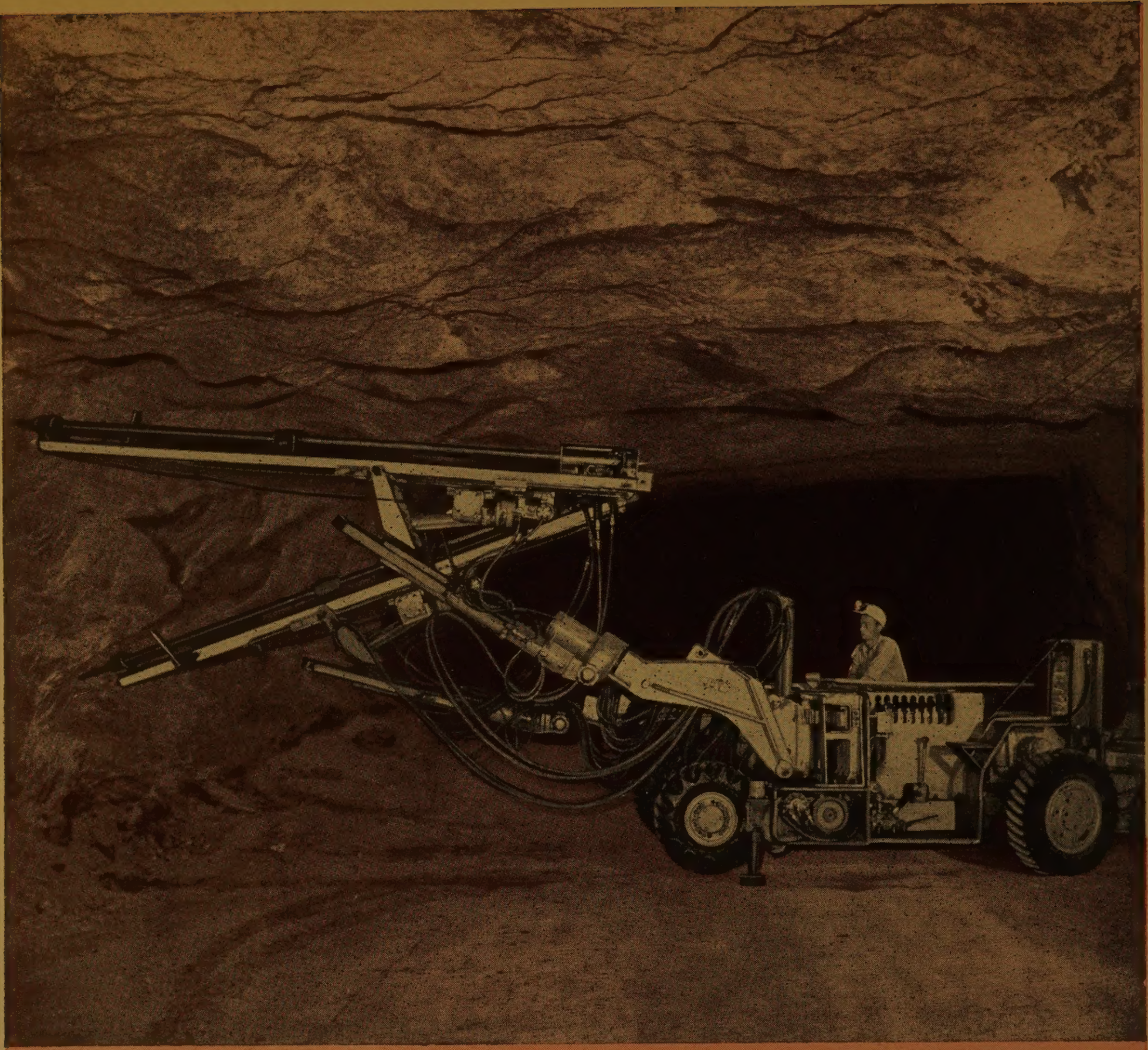

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Trade Listing

National Agricultural Chemicals Association, Association Building, 1145 19th St., N.W., Washington, D. C. Lea Hitchner, executive secretary.

National Plant Food Institute, 1700 K St., N. W., Washington, D. C. Paul Truitt and Russell Coleman, executive vice-presidents.

Regional Offices listed on page 123.

American Society of Agronomy, 2702 Monroe St., Madison Wisc. L. G. Monthey, executive secretary.

American Phytopathological Society, S. E. A. McCallan, secretary, Boyce Thompson Institute, Yonkers, N. Y.

American Chemical Society, 1155 16th St., N. W., Washington, D. C.

Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington, D. C., William Horwitz, secretary-treasurer.

Agricultural Ammonia Institute, Hotel Claridge, Room 305, Memphis, Tenn., Jack Criswell, executive vice president.

American Society of Agricultural Engineers, F. B. Lanham, secretary, 505 Pleasant St., St. Joseph, Mo.

Carolinas-Virginia Formulators Association, 516 S. Salisbury St., Raleigh, N. C. Hugh Horn, secretary-treasurer.

California Fertilizer Association, Sidney Bierly, executive secretary, Suite 1, Boothe Building, 475 Huntington Drive, San Marino California.

Chemical Specialty Manufacturers' Association, 110 East 42nd St., New York City, Dr. H. W. Hamilton, secretary.

Entomological Society of America, 1530 P. Street N. W., Washington, D. C., R. H. Nelson, secretary.

Mid-West Soil Improvement Committee, 121 West Wacker Drive, Chicago 1, Ill. Z. H. Beers, executive-secretary.

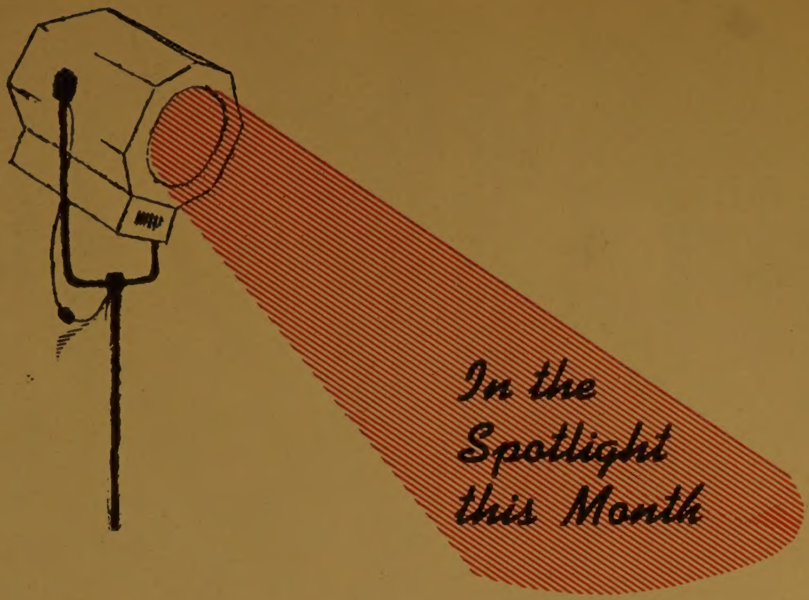
National Nitrogen Solutions Association, 2217 Tribune Tower, Chicago, Ill. M. F. Collie, secretary.

National Cotton Council, PO Box 9905, Memphis, Tenn.

Soil Science Society of America, 2702 Monroe St., Madison, Wisc. L. G. Monthey, executive secretary.

Weed Society of America, W. C. Shaw, secretary, Field Crops Research Branch, Beltsville, Md.

Western Agricultural Chemicals Association, Charles Barnard, executive secretary, 2466 Kenwood Ave., San Jose, Calif.



- **Selling Liquid Fertilizer** . . . An eastern liquid fertilizer manufacturer makes the interesting observation that he would welcome more competitors to help expand the market. Profits are obtained not just from sales of materials, but can also be realized from rental of equipment. Page 28.

- **Respiratory Equipment** . . . The first of a two-part article reviewing respiratory protective devices, tests with various insecticides, use and care of the equipment. Page 30.

- **Phosphoric Acid** . . . A report on a continuation of studies of this acid in the production of high-analysis liquid fertilizers, and its possible commercial application. Page 33.

- **Handling Orders** . . . Use of teletype, punched tapes, and automatic typewriter, coordinated into Integrated Data Processing is revolutionizing the front office handling of orders in some agricultural chemical companies. Page 35.

- **Aerial Application** . . . An Illinois applicator discusses such questions as types of jobs a plane can do, costs and charges, financial responsibility, aerial fertilizing, etc. Page 46.

- **Tomato Production at B & L** . . . Horticulturists from most of the big grower organizations visit B&L Farms in Florida to observe its methods of tomato production. Pesticide formulations for this farm are delivered in pre-determined bagged quantities, and B & L states this system avoids product contamination. Page 48.

- **Selective Weed Control** . . . Selective herbicides 2,4-DB and MCPB are harmless to plants, except when the plants are themselves capable of converting these substances—inside the plant—to the hormone herbicides MCPA and 2,4-D. Page 63.

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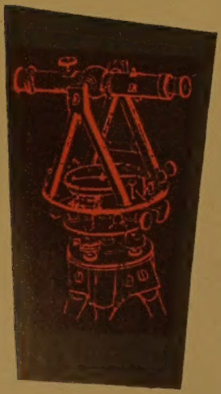

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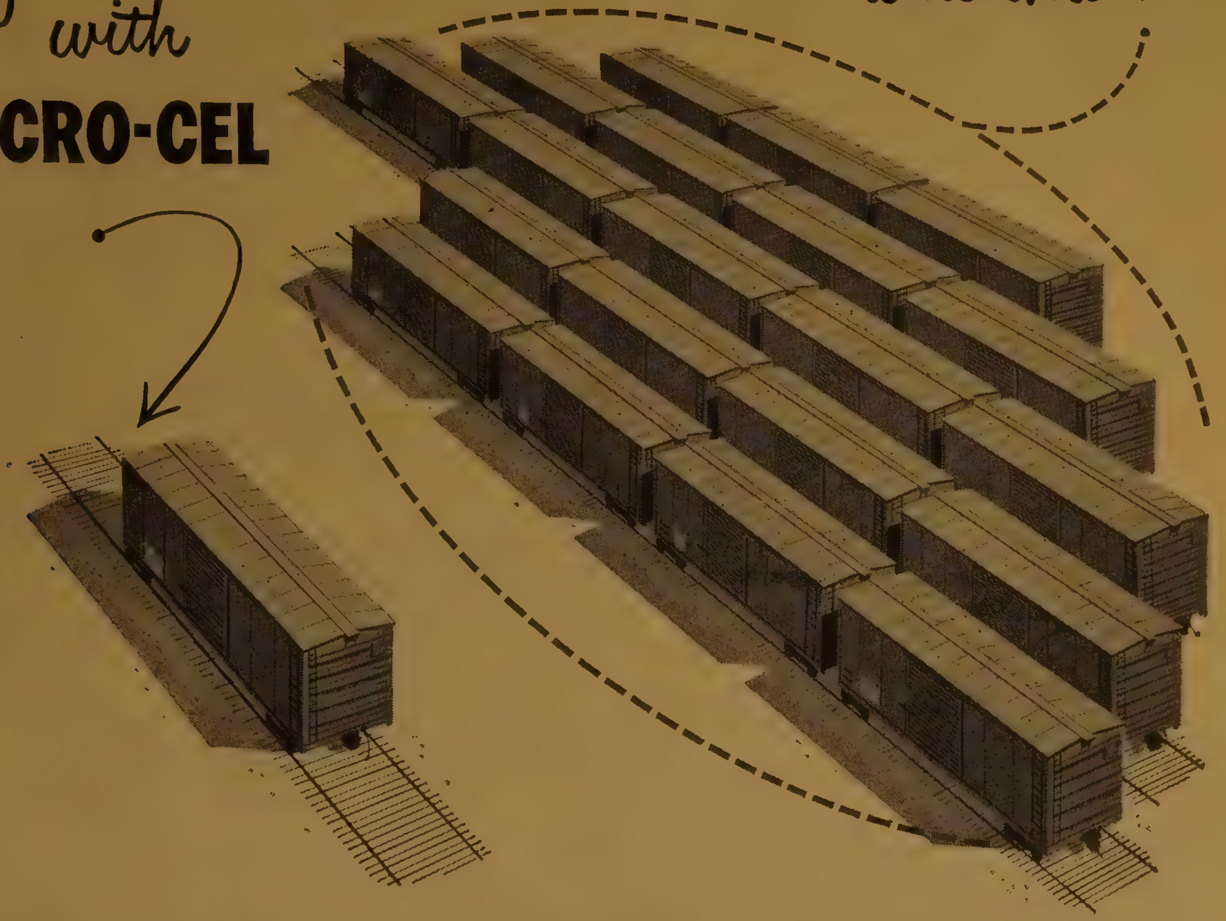

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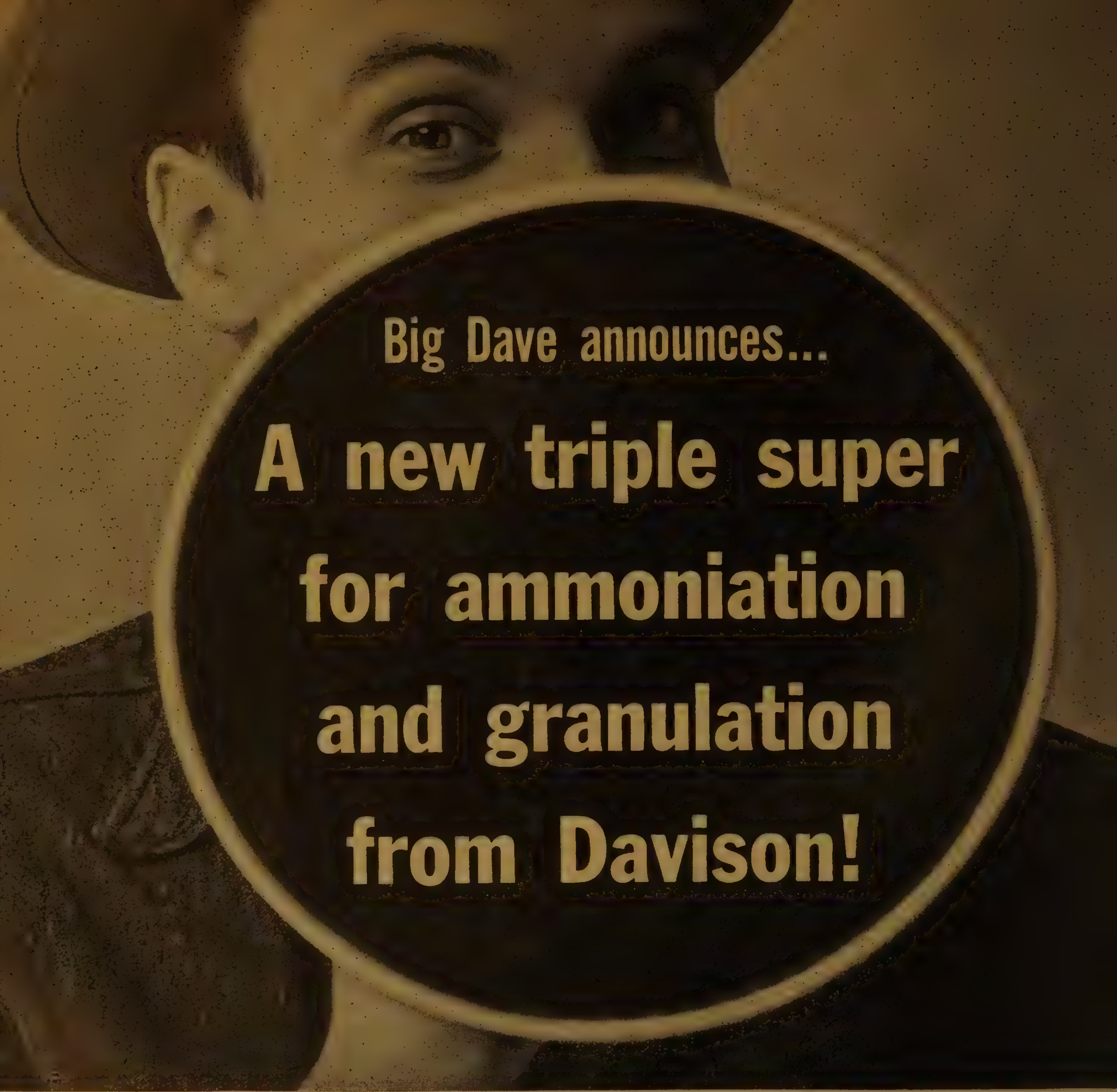

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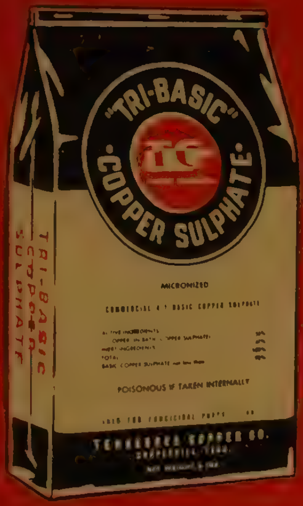

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Industry Meeting Calendar

Aug. 4—Annual Meeting, National Joint Committee of Fertilizer Application held in conjunction with American Society of Agronomy, Purdue University, Lafayette, Ind.

Aug. 4-8 — American Society of Agronomy, Annual Meeting, Purdue University, Lafayette, Ind.

Aug. 10-14—29th Annual Meeting, Rocky Mountain Conference of Entomologists, Cameron Pass 4-H Club Camp, Gould, Colorado.

Aug. 12-13—Summer Field Tour of the Pesticide Institute, Ohio Agricultural Experiment Station, Wooster, Ohio.

Aug. 12-14—Beltwide Cotton Mechanization Conference. Civic auditorium, Brownsville, Texas.

Aug. 20-24 — Annual Convention, Canadian Fertilizer Association, Murray Bay, Quebec.

Aug. 24-28—50th Meeting of American Phytopathological Society and 9th Meeting of American Institute of Biological Sciences, U. of Indiana, Bloomington, Ind.

Oct. 13—Agricultural Research Institute, Panel on Problems Related to Agriculture in the Fertilizer Producing Industry. Academy of Sciences Building, Washington, D. C.

Oct. 14-15 — Western Agricultural Chemicals Association Annual Meeting, Villa Hotel, San Mateo, Calif.

Oct. 16—National Plant Food Institute Conference on Chemical Control Problems. Shoreham Hotel, Washington, D. C.

Oct. 20-24 — Farm Safety Sessions, 46th National Safety Congress and Exposition, Hamilton Hotel, Chicago.

Oct. 20 — Annual Sales Clinic of Salesmen's Assn. of the American Chemical Industry, Inc., Roosevelt Hotel, New York.

Oct. 22-24—Pacific Northwest Plant Food Assn., Gearhart, Oregon.

Oct. 28-29—Northwest Garden Supply Trade Show sponsored by the Oregon Feed and Seed Dealers Assn., Portland, Oregon.

Oct. 29-31 — National Agricultural Chemicals Association Bon Aire Hotel, Augusta, Ga.

Oct. 29-31 — Eighth annual meeting of the Entomological Society of Canada and the 95th annual meeting of the Entomological Society of Ontario, Guelph, Ontario.

Oct. 30 — Southeastern Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Nov. 5-7—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 9-10 — California Fertilizer Assn. 35th Annual Convention, Ambassador Hotel, Los Angeles.

Nov. 13-14 — Canadian Chemical Specialties Manufacturers, Queen Elizabeth Hotel, Montreal.

Nov. 24-25—Eastern Branch, Entomological Society of America, Lord Baltimore Hotel, Baltimore.

Dec. 1-4—Entomological Society of America, Sixth Annual Meeting, Hotel Utah, Salt Lake City, Utah.

Dec. 3-4—North Central Weed Control Conference, Netherland Hilton Hotel, Cincinnati.

Dec. 3-5 — Agricultural Ammonia Institute, Annual Meeting, Morrison Hotel, Chicago.

Dec. 9-11—Chemical Specialties Manufacturers Assn., Sixth Annual Meeting, Commodore Hotel, New York.

Dec. 17-18 — Beltwide Cotton Production Conf., Rice Hotel, Houston, Texas.

Dec. 26-30—American Association for the Advancement of Science, 125th Annual Meeting, Washington, D. C.

Jan. 20-22, 1959 — California Weed Conference, Santa Barbara, Cal.

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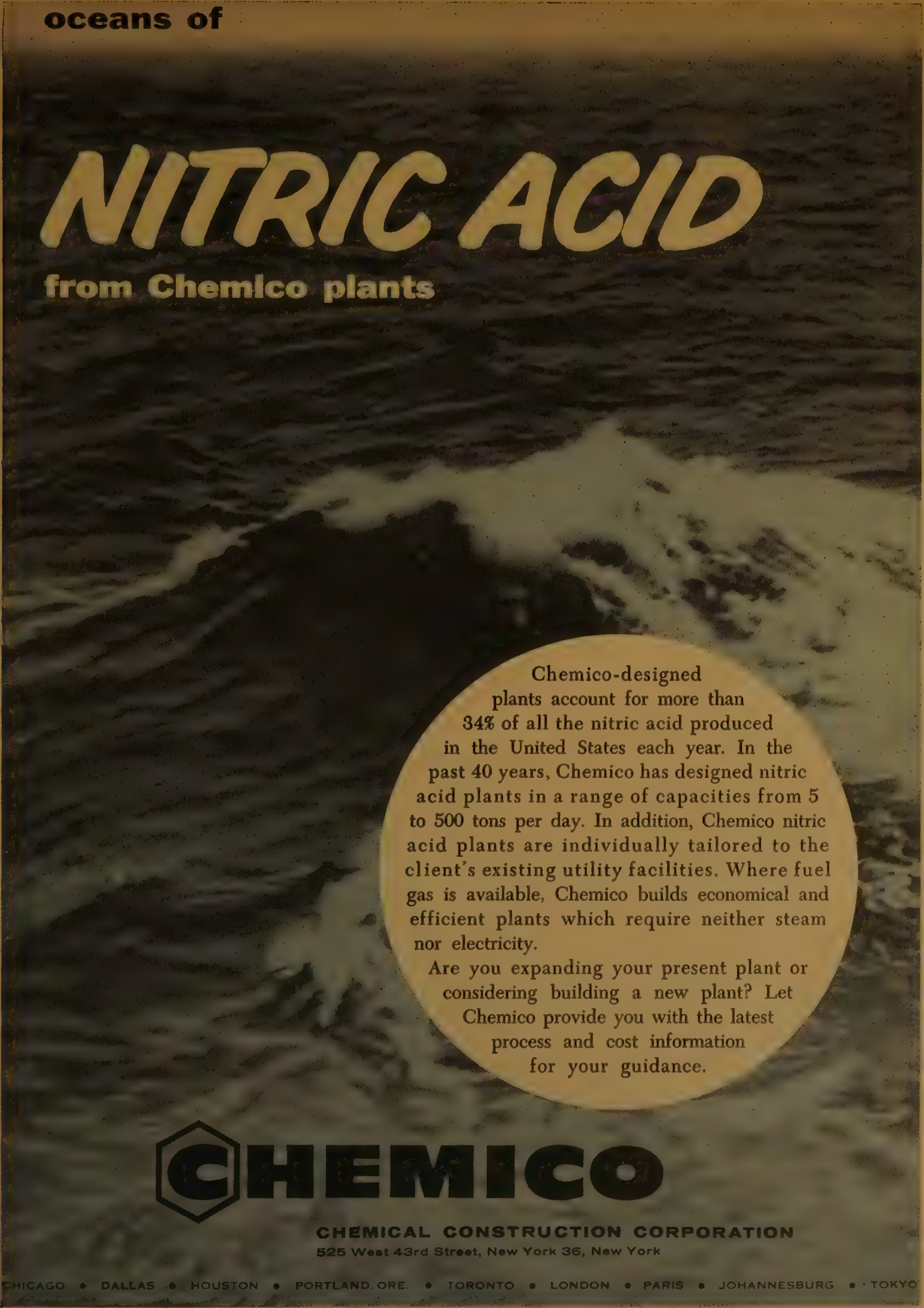
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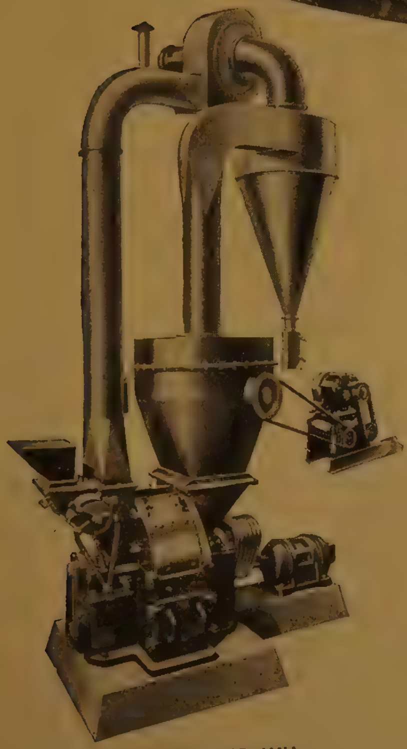

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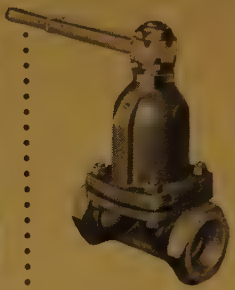
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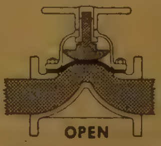
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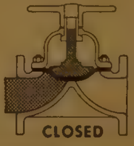
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MATERIALS	LBS
TREBO-PHOS Triple Superphosphate — (APA 48.28%; Ins. 1.04%; H_3PO_4 3.09%; Moisture 7.25%.)	628
Normal Superphosphate	493
Nitrogen Solution: (25% NH_3; 69% NH_4NO_3)	62
Anhydrous ammonia	88
H_2SO_4, 66° Be	130
Potash	645

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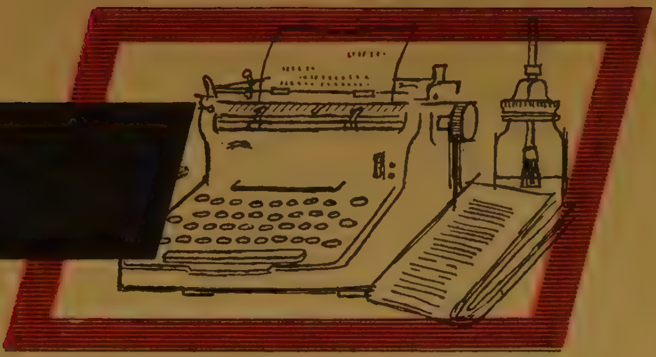
EDITORIALS



THE outcome of a recent lawsuit in Winnipeg, Canada, emphasizes once more the importance of careful precautions and thorough advance instructions before application of herbicides in areas adjacent to crop lands. Two market gardeners received a $12,000 award for alleged injury to eleven acres of garden crops. The factors which influenced the judge's decision were that: adequate supervision was not given to preparation of the spray mix, the men who applied the herbicide were not given proper instructions, and the area was not inspected carefully in advance of the spray application.

Such decisions as this one emphasize once more that, while agricultural pesticides can be employed with complete safety, they can also expose the user to serious damage claims. We are reminded that back about ten years ago, when modern herbicides were first being introduced, a series of similar cases reputedly cost one big national marketer of pesticides about a million dollars and knocked it completely out of the pesticide business.

* * * * * *

WITH productive capacity for ammonia and other types of nitrogen fertilizers currently outrunning demand by a substantial margin, it is difficult to visualize,—on a short term basis at least—the need for increased synthetic ammonia capacity. Yet the chemical industry still is confident of a bright future for ammonia, and is freely predicting that the current condition of oversupply will not last long. In a recent analysis of the market, one authority predicted that by 1975 the synthetic ammonia industry will have to increase production by about eighty per cent to meet demand.

"Soil enrichment needs alone", he said, "could preempt existing ammonia capacity in a few short years. In addition to some 8 billion pounds of new capacity for predictable agricultural and industrial uses, some 50 million dollars worth of extra capacity will have to be built concurrently to meet demand for ammonium nitrate as an explosive."

* * * * * *

ANOTHER important legal decision (by Judge Walter Bruchhausen in Federal District Court in Brooklyn) announced last month just as we were going to press, and reported briefly in our July issue, is the source of considerable relief to insecticide manufacturers and applicators. It was a sweeping victory for the U.S.D.A. and the gypsy moth spray program. Judge Bruchhausen ruled the complainants had "presented no evidence that they or anyone else were made ill by the spraying" and concluded that the spray program to combat the gypsy moth was "within the proper exercise of the police power of the designated officials".

The New York *World Telegram* which beat the drum so vociferously last summer for the organic farmer groups which spearheaded the suit took the decision rather quietly. So shattered was the *Telly's* insecticide "expert", William Longgood, that he wrote an entire column on the story without once referring to anyone being "doused with a lethal spray."

* * * * * *

STILL another decision of considerable significance to the pesticide industry is the recent ruling by the House Interstate Commerce Committee that pesticides are not chemical preservatives. The committee came to this decision in the course of

(*Continued on Page 105*)

Delaware Valley Chemical Corporation

A Producer Of Looks For

THE Delaware Valley Chemical Corporation in Swedesboro, New Jersey, occupies what would seem to be the enviable position of being the only liquid fertilizer manufacturer in its area. In fact, there are only about three liquid fertilizer plants in the entire Northeast. Salvatore Vasta, one of the firm's owners, however, is anxious to see some competition move in.

More liquid fertilizer companies in South Jersey would help make farmers conscious of liquids, Mr. Vasta feels, and as more liquids are sold, D.V.C.'s business will increase correspondingly. Unlike conditions in the Midwest, where fertilizer use is on the increase, any liquid fertilizer sold on the East coast finds a market at the expense of dry fertilizer.

Liquid fertilizers are normally produced by small local plants serving only limited areas. In this part of the country, at least, Mr. Vasta feels that it would be impractical for any plant to consider selling or delivering much more than 20 or 30 miles in each direction. Farmers in areas where liquid fertilizers are not available do not find it practical to have liquids shipped in. Although liquids are cheaper to apply than dry fertilizers, the cost of moving these low analysis materials for any great distance soon outweighs any saving in labor.

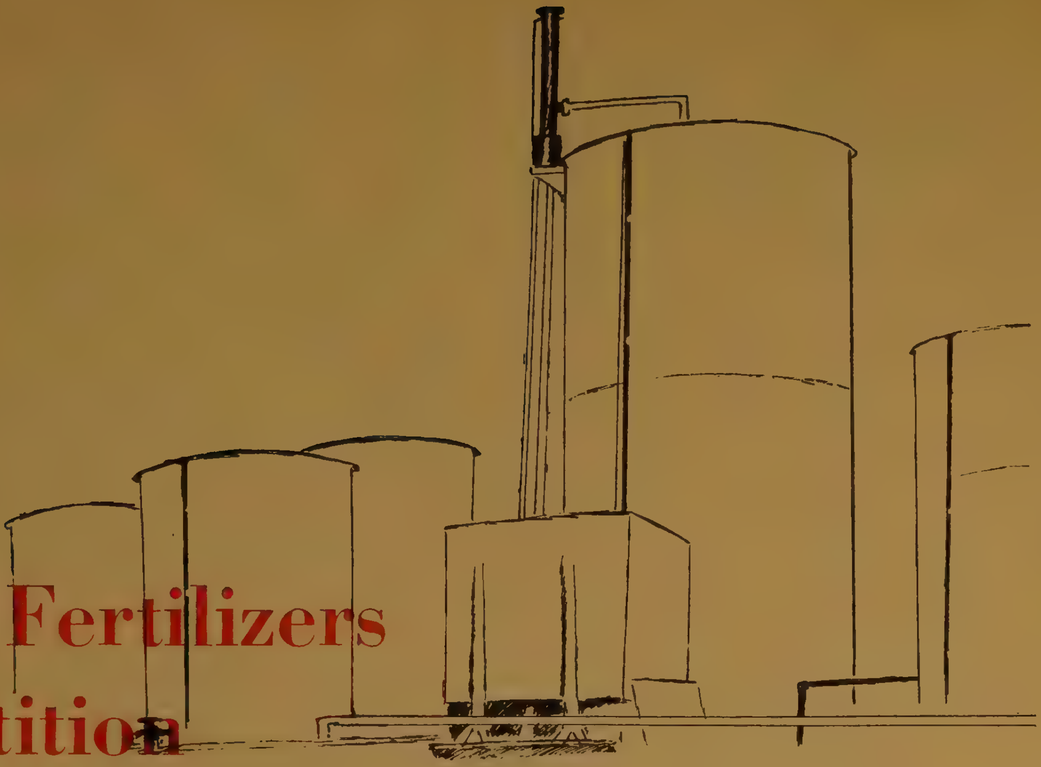
Mr. Vasta does not believe that it would be practical for him to open up two or three more liquid plants himself in locations adjoining his present area of operations. The initial cost of setting up a liquid fertilizer plant is in the neighborhood of $60,000, and although he would be selling more fertilizer with three plants than with one, it would involve more of a capital investment than he is in position to commit. He points out that there is no price advantage to be gained from buying fertilizer ingredients in bulk. Each plant would require its own distribution equipment, and a manager would have to be employed to run each operation. In addition, liquid fertilizer commands a lower price on the East coast than it does in other parts of the country. Mr. Vasta cites as an example a 5-10-10 liquid fertilizer which sells for more on the West coast than it does in New Jersey. "And we are thousands of miles away from the potash source," Mr. Vasta points out.

Although there is no immediate big profit in the liquid fertilizer business, Mr. Vasta said, it provides one of the few opportunities today for a man to get into the manufacturing business and still be independent. A liquid fertilizer manufacturer is not dependent on his suppliers. His raw materials are all on the world market and he can choose from many stable sources.

Besides commercial growers, the market for liquid fertilizers takes in home gardens and highway rights of way. In fact, Mr. Vasta does not see agriculture as being the main market for liquid fertilizers on the East coast because of the ever-changing picture of farming. Mr. Vasta believes, however, that farmers would use a lot more fertilizer if they would aquire more knowledge of NPK. He feels that the average farmer does not understand fertilizer analysis and tends to simply buy the fertilizer that is recommended for his general area. If farmers knew what they needed and what they were getting when they bought fertilizer, the fertilizer business would improve, materially, he feels.

Mr. Vasta recommends that farmers specialize on one or two crops. They would be much better off financially than they are now, he said. Too many farmers try to grow too large a variety of crops, he continued, whereas, if they dealt with only a few crops, they would not

Liquid Fertilizers Competition



At Left: a view of the DVC plant at Swedesboro, N. J., showing mixing and storage tanks in background and mobile applicating equipment and supply truck in foreground.

have to invest in such a wide range of equipment types and fertilizer analyses.

Mr. Vasta is optimistic about the use of liquid fertilizers on rights of way in New Jersey where highways are plentiful. He feels that if there were enough liquid plants spread about the state they could be assigned the job of applying roadside chemicals as a profitable sideline. He pointed out that both herbicides and fertilizers could be applied by the liquid fertilizer companies with their existing equipment and with less effort than that required to apply dry products.

An increase in home gardening also can be expected to help the liquid fertilizer business, because of the ease with which liquids can be handled and applied.

Besides profits from the sale of fertilizers, a liquid plant operator can realize substantial returns from the rental of his equipment to farmers, Mr. Vasta pointed out. He recommends, however, that the farmer purchase his own equipment. If they buy the kind of equipment that also can be used to spray and fumigate, he said, it will soon pay for itself. In addition, a farmer who has invested in his own application equipment, can be expected to continue buying liquid fertilizers.

DVC leases applicating equipment and fills it either directly from the supply truck, as shown, or from field tanks.

Supply trucks and applicators are as much a part of a liquid plant as the converters and batch tanks. A usual practice is to have three trucks to service six applicators. D.V.C., however, uses only one truck to supply six applicators, but employs three field tanks that can be left at the fields being fertilized. This method saves the cost of two trucks and eliminates the need for hiring two drivers.

Aqua ammonia, 3-9-9, 5-10-10, and 5-10-5 were the four main types of fertilizer sold by D.V.C. in 1957. The major crop in the Swedesboro area is asparagus. Sweet potatoes, tomatoes, and peppers follow in that order and large dairy farms are located to the north and south of the area. The increasing use of irrigation in the Delaware Valley has been a boon to Mr. Vasta's liquid fertilizer business. Liquid fertilizer, of course, lends itself readily to irrigation systems. The fertilizer is run into the irrigation lines and then the water is added to wash it into the soil.

(Continued on Page 105)

Respiratory Protective Devices

Part 1

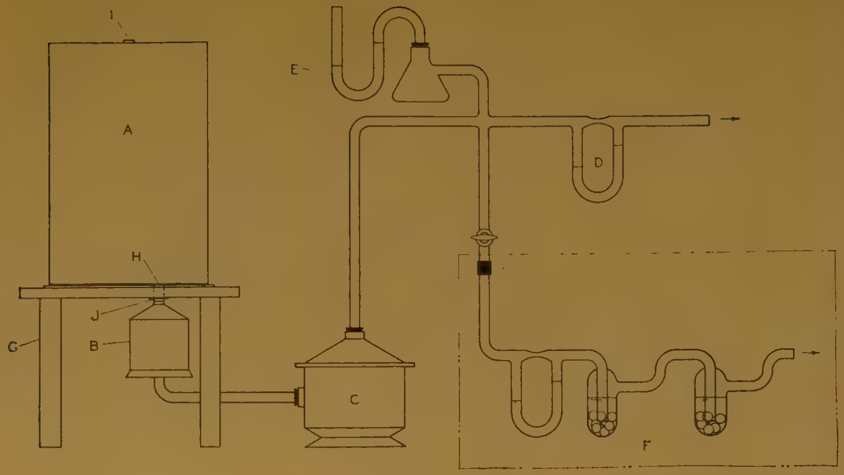


Figure 1

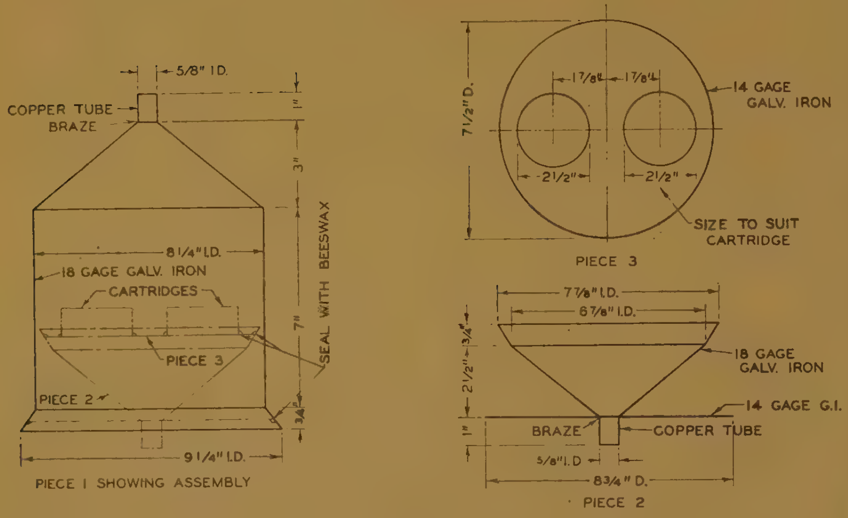


Figure 2

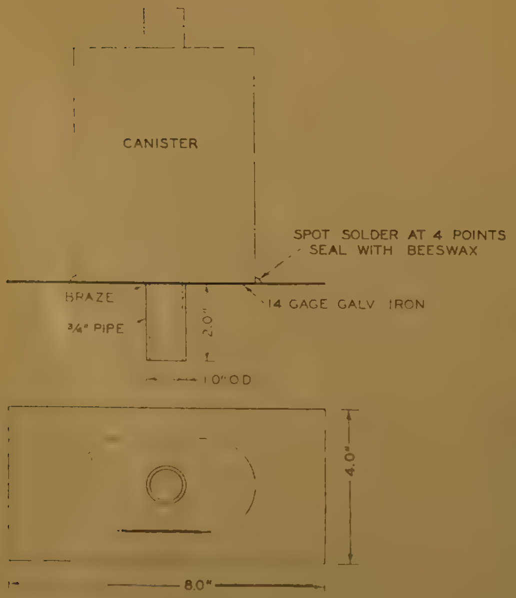


Figure 3

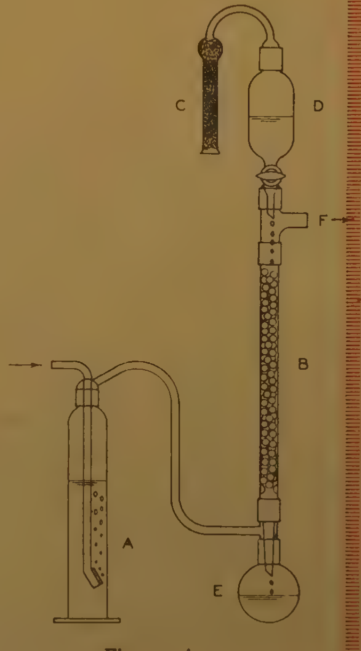


Figure 4

IN 1947, when the first organic phosphorus insecticides were being tested, none of the commercially available respiratory devices had been proved to afford protection to the operator. Through experiments with such devices designed for industrial uses and other materials as filtering or absorbing mediums, satisfactory units were developed for the pesticides, including fungicides, then available.[1,2,3] However, when more volatile organic phosphorus compounds came into use later, more efficient filtering units were needed. This article describes the apparatus and methods used in testing the performance of respiratory protective devices. It also reports on the pesticides tested thus far and the filtering and absorbing units which have proved effective.

Respiratory protective devices may be divided into two classes—respirators and gas masks. Respirators are constructed with a facepiece that covers the mouth and nose but gives no protection to the eyes. The filtering and absorbing unit is called a cartridge, and is mounted directly on the facepiece by means of a firmly fitting screw cap or clamp. Cartridges

Methods for Testing Them Against Pesticides

By R. A. Fulton and Floyd F. Smith

Entomology Research Division, Agricultural Research Service
U. S. Department of Agriculture, Beltsville, Md.

for pesticides contain the filter and the absorbent, such as activated charcoal, either as a single or separate unit. Because of the limited capacity of cartridges, especially the filter area, their use is restricted to protection against dusts, mists, and low vapor concentrations of insecticides during field use.

Gas masks, which usually cover the entire face, are equipped with canisters. The canisters contain more absorbing material and a larger filter area than the cartridges. Gas masks shoud be worn by workers exposed to high concentrations of insecticides while formulating or mixing them in closed or inadequately ventilated spaces or when applying insecticides, including aerosols, in closed spaces, such as greenhouses.

Where a compressed-air source is available, a facepiece connected to this source has obviated the need for a canister or cartridge.

Testing Apparatus

The apparatus developed for determining the efficiency of respirator cartridges and gas-mask canisters is shown in Figure 1. It consists of a dusting or spraying chamber (*A*), a cartridge or canister holder (*B*), a chamber for exposing the test insects (*C*), a flowmeter (*D*), a manometer (*E*) to determine the resistance to the air flow, and a sampling unit (*F*) for withdrawing air for chemical analysis. Chamber *A* is a large bell jar, 18 x 32 inches, inverted on the stand (*G*), which is covered with a sheet of glass or stainless steel with one hole (*H*) to match a 1-inch hole in the stand. The dust or spray is injected through a 1-inch opening (*I*) in the top. This opening is left open at all times to admit air. A ½-inch pipe flange (*J*) fastened to the underside of hole *H* in the stand provides an outlet for connection to the canister or cartridge being tested. The cartridge or canister holder is connected to the chambers *A* and *C* by means of 20-mm. glass tubing with short lengths of rubber tubing at connecting points.

Air is drawn through the apparatus by means of a vacuum pump at the rate of 16, 32, or 64 liters per minute. These are the breathing rates that have been established during different types of work.

The cartridge holder is shown in detail in Figure 2. It was constructed from 18-gauge galvanized iron. Removable rings permit the testing of either single or double cartridges. The illustration shows the ring for double cartridges. When the unit is assembled for use, all the joints are sealed with hot beeswax. After the beeswax has been painted on a joint, the heating element of a 100-watt transformer, pistol-type, soldering gun is moved slowly over the wax to melt it and to remove the contained air.

Since most gas-mask canisters are flat on the bottom (or inlet side), the most satisfactory way to provide an inlet from the spray chamber is to attach the canister to a flat inlet adapter (Figure 3). The adapter is made by silver-soldering or brazing a 2-inch length of ¾-inch pipe to a 4- x 8-inch piece of 14-gauge galvanized sheet iron. The canister is then soldered to the plate at four points, and the remaining joint between the canister and the plate is sealed with hot beeswax in the same manner as for the cartridge holder.

An apparatus to produce concentrated vapors for testing the efficiency of gas-mask canisters is shown in Figure 4. Air is passed at the rate of 0.5 liter per minute through a fritted-glass bubbling unit (*A*) containing the insecticide, and then through a column of glass beads (*B*) to remove small liquid droplets that might be carried in the air stream. The insecticide is allowed to drip into *B* from the separatory funnel (*D*). The beads are kept covered with the insecticide during the exposure period. The excess liquid is trapped in the flask (*E*.) The outlet (*F*) is connected directly to the canister or, when dilution of the vapor with air is desired, to the air stream moving through the canister. To prevent moisture from entering *D*, the insecticide is protected with a drying tube (C). The sampling unit and the insect-exposure chamber are the same as for the cartridge tests (Figure 1). To control the vapor pressure of the insecticide, the entire unit is placed in a large constant-temperature box. All the tests were made at 85° F.

Methods of Testing

CHEMICAL ANALYSES

Except for parathion and malathion, the chemical analytical procedures are rather involved. As parathion has a definite absorbing band at a wave length of 274 millimicrons, the amount passing through the filter is determined by bubbling measured volumes (1-2 liters) of the test air through 5 ml. of absolute alcohol, and comparing the optical density with known standards of parathion in a spectrophotometer. The chlorinated hydrocarbons are analyzed by passing measured samples of air through a quartz tube containing platinum foil heated to a bright red. The gases are absorbed in a column containing glass beads wet with a chlorine-free solution of sodium carbonate containing arsenic trioxide (1 gram to 80 ml. of saturated sodium carbonate solution and 20 ml. of distilled water). Washings from the glass beads are transferred to a Nessler tube, acidified with nitric acid, and treated with an excess of silver nitrate solution, and the chlorine is determined by comparison with known standards.

BIOASSAYS

Since no satisfactory chemical procedures were available for determining the amount of many of the insecticides in the air after they had passed through the cartridge or canister, a bioassay method was developed. Because of the fast response of aphids and mites to most organic phosphorus compounds, it is possible to detect their presence in the air within a few minutes after they have passed through the filter.

Leaves infested with spider mites or aphids are placed in two or three small glass bottles filled with water. The bottles are set in a 6-inch petri dish with white filter paper on the bottom so that any fallen insects can be collected during exposure in chamber C (Figure 1). After exposure for 30 to 60 minutes, each leaf is transferred to a small vial filled with water and set in a 400-ml. beaker. A layer of paraffin in the bottom of the beaker supports the vial and provides a light-colored surface on which fallen insects are readily observed. The rim is given a light coating of lanolin to prevent any surviving insects from escaping. Mortality counts are made 4 to 6 hours after the exposure. Aphids and mites shrivel rapidly after exposure to TEPP and certain other organic phosphorus comppounds. A yellow exudate is usually presented at the opening of the aphid's cornicles. Mites affected by parathion, DMC, Kelthane, or several other chemicals retain their lifelike appearance for several hours after death.

Two-spotted spider mites (*Tetraanychus telarius* (L.)) are reared on lima beans. Cotyledon leaves of young bean plants are reduced by trimming off the margins before mites are transferred to them for use in the test chamber. To infest the test leaves, infested leaves from plants in stock colonies are pinned to them and the mites are allowed to crawl over. Placing the plants under a 200-watt light increases the speed of mite transfer. Only active mites are present on the leaves, which are immediately used in tests. Mortality counts are always made within 24 hours after the mites have been transferred to the test leaves, thus reducing the occurrence of newly hatched nymphs or newly emerged adults.

Several species of aphids have been used in these tests, but for most experiments green peach aphids [*Myzus persicae* (Sulz.)] are used. These aphids are reared on cabbage, smooth-leaved kale, or collards; small infested leaves are used without transfer, but larger leaves are trimmed down to fit within the test chamber.

DEVELOPMENT OF FILTERS

Our work in 1949 showed that the common absorbing agents, such as activated charcoal and soda lime, removed little, if any, of the organic phosphorus insecticides in sprays or dusts from the air. Halogenated materials were removed quantitatively with activated charcoal. Impurities found in organic phosphorus compounds were usually removed with activated charcoal or a coarse filter. For adequate protection against these insecticides it was necessary to use fine filters.

Insecticide formulations are classified according to particle size as follows:

	Microns
Coarse sprays	400 and larger
Fine sprays	100-400
Mists	50-100
Aerosols and fogs	0.1-50
Fumes, smokes, or vapors	0.1 and less
Coarse dusts	175 and larger
Medium dusts	45-175
Fine dusts	44 and less

The filters must be capable of removing all the particles in this wide range of sizes and also keep the breathing resistance to a minimum. Filters for this purpose are classified according to their ability to remove particles of a specified minimum size and not according to the actual size of the holes. Within certain limits the diameter of the filter fibres has little relation to the size of the particles that will be stopped. Filters may change in efficiency while the air is being drawn through if the fibers change their position. For this reason, felt- and glass-fiber filters are usually treated with plastic to hold the initial position of the fibers and to prevent the tendency to reduce the depth of the filtering mass. Dust filters usually increase in efficiency as more particles are deposited within them. This is not true with filters removing liquid particles, as the filtering medium becomes moist and compact.

Legend:

Figure 1. Apparatus for determining the efficiency of gas-mask canisters and respirator cartridges.

Figure 2. Cartridge holder.

Figure 3. Canister inlet adapter.

Figure 4. Apparatus for saturating air with organic phosphorus compounds.

The conclusion of this article will appear in the September issue of *Agricultural Chemicals*.

PHOSPHORIC acid of high concentration

In the January 1958 issue of AGRICULTURAL CHEMICALS, some information was presented on phosphoric acid of unusually high concentration, called superphosphoric acid. This acid is a relatively new raw material developed by the Tennessee Valley Authority for use in the manufacture of solid and liquid fertilizers. A paper describing the manufacture of this acid and its chemical and physical properties appears in the *Journal of Agricultural and Food Chemistry*, April 1958. A paper by Striplin, Stinson, and Wilbanks, which described the use of the acid in the production of high-analysis liquid fertilizers, was given before the American Chemical Society in September 1957. TVA has continued with studies of the properties of the highly concentrated phosphoric acid and is continuing with the investigation of its possible commercial applications.

by David McKnight and
M. M. Striplin, Jr.
Tennessee Valley Authority
Wilson Dam, Ala.

UNTIL a few years ago, practically all the phosphoric acid used in the fertilizer industry was made in captive plants by the wet process, which gives an impure acid containing about 30% P_2O_5. This acid usually is concentrated to about 54% P_2O_5 content for use in making concentrated superphosphate. It has not found an important place in the production of liquid fertilizer solutions because its impurities precipitate on neutralization and cause trouble in handling and distribution.

More recently, with expansion of facilities for producing phosphorus by the electric-furnace process, acid made from phosphorus is becoming available to the fertilizer industry. The chief use of this relatively pure acid, called phosphatic fertilizer solution, in the fertilizer industry has been for the production of liquid fertilizers, the demand for which is increasing rapidly.

Electric-furnace phosphoric acid, as ordinarily produced, has a concentration of 54 to 58% P_2O_5 (75 to 80% H_3PO_4) and is fluid at ordinary temperatures. Phosphoric acid of higher P_2O_5 contents, except those containing about 75 to 77% P_2O_5, solidify or are exceedingly viscous at ordinary temperatures and, therefore, have not been considered satisfactory for use in the fertilizer industry from the standpoint of shipping, storing, and handling. Acid containing 75 to 77% P_2O_5 is relatively fluid; the merits of acid in this concentration range apparently were not recognized until TVA's recent studies. The acid is a mixture of roughly equal proportions of orthophosphoric acid (H_3PO_4) and polyphosphoric acids such as pyrophosphoric acid ($H_4P_2O_7$). The presence of acids other than orthophosphoric acid imparts to the superphosphoric acid some of its valuable properties.

TVA has developed methods for ammoniating phosphoric acid to produce liquid fertilizers of a high plant food content, with base solutions of an 11-33-0 or 12-36-0 grade.

TVA has developed methods for ammoniating the acid to produce liquid fertilizers of higher plant food content than those now being marketed. The base solutions produced are of 11-33-0 or 12-36-0 grade in contrast with the 8-24-0 grade that is the most concentrated neutral solution that can be produced from ordinary 54% P_2O_5 acid and which will not salt out at about 32° F. Other materials such as urea, urea-ammonium nitrate solution, and potassium chloride can be added to the base solutions to produce grades such as 7-21-7, 9-18-9, or 10-10-10 which do not salt out when stored at a temperature of 32° F.

The presence of the polyphosphates in the superphosphoric acid makes it possible to produce solutions of high analysis, and the process for production of these solutions depends on the avoidance of hydrolysis or conversion of the polyphosphates into orthophosphate. In the production of 8-24-0, it is common practice to charge water and phosphoric acid to a tank and then add aqua ammonia to it. In the production of 11-33-0, undiluted superphosphoric acid first is charged to the tank, and then ammonia and any water required for dilution are added simultaneously to it. Another and preferable method is to start with a small amount of previously produced 11-33-0 solution in the tank and to feed acid, ammonia, and water to it simultaneously at such rates as to maintain an approximately neutral solution.

With either method it is necessry to remove heat to avoid boiling of the solution during the ammoniation reaction. In general, it is desirable to maintain the temperature below about 180° F. This is frequently done by pumping the solution through a water-cooled coil and back to the reaction tank, but cooling can be accomplished by pumping water through a coil immersed in the solution or by spraying water on the outside of the reaction tank. Some plants may have to provide additional facilities for removing the increased amounts of heat involved in the production of the higher grades of liquid fertilizer. However, many plants already have adequate cooling facilities and can use superphosphoric acid to produce the high-analysis liquid fertilizers without changes in their equipment. The acid is more viscous than acid of ordinary concentration, and better results may be obtained in some plants by changing the acid pump and meter.

Still higher grade liquid fertilizers may be made from phosphoric acid that is a little more concentrated than the 75 to 77% P_2O_5 acid mentioned above. A solution of 12-43-0 grade that did not salt out when stored for 7 days at 32° F. or at room temperature for a month has been produced in the pilot plant; this solution was obtained by ammoniating phosphoric acid containing 78% P_2O_5. This acid may be difficult to ship without danger of crystallization; however, it could be ammoniated at the point of production and the ammoniated solution shipped for use as a base solution for liquid fertilizer production. In further tests the 12-43-0 was used to make a 13-39-0 solution by addition of urea and water; this solution did not crystallize on storage for 7 days at 32° F.

The ammonium polyphosphates in the high-analysis liquid may hydrolyze slowly to orthophosphates. The rate of hydrolysis probably increases with reduction in pH and with increase in temperature. However, essentially neutral solutions (pH 6.5 to 6.7) such as 11-33-0 are sufficiently stable at room temperature that they may be stored a year or more before sufficient hydrolysis occurs to cause crystallization.

TVA has filed an application for a patent covering the novel features of the process for the production of high-analysis liquid fertilizers from superphosphoric acid. Several companies have availed themselves of the opportunity to take nonexclusive royalty-free licenses under this application.

Tonnage lots of high-analysis liquid fertilizers of 11-33-0, 10-10-10, 5-15-10, 7-21-7, and 9-18-9 grades have been made both by TVA and by several commercial plants.

An advantage of the high-analysis liquids is that some trace element salts are more soluble in them than in conventional liquid fertilizers. In some tests it was found that the sulfates of iron, zinc, and copper were much more soluble in a solution of 11-33-0 grade produced from superphosphoric acid than in 8-24-0 made from ordinary phosphoric acid. The concentration of manganous sulfate and of borax was about the same in both solutions.

Another interesting use for the acid might be in the production of very high-analysis, no-nitrogen or chlorine-free liquid fertilizers. In exploratory tests, a 0-27-36 solution was obtained from superphosphoric acid and potassium hydroxide. By adding urea and more acid, a 5-20-20 solution that did not salt out at 32° F. was obtained.

Superphosphoric acid can be used also in the production of concentrated superphosphate in much the same manner as acids of the usual concentrations are used. Considerable quantities have been produced in the TVA plant, which employs a cone mixer. The product contains about 54% available P_2O_5 as compared with 46% in concentrated superphosphate produced from wet-process acid to 48% in that produced from electric-furnace acid of the usual concentration. The higher concentration results from the formation of the anhydrous rather than the hydrated form of monocalcium phosphate and from the evolution of a greater portion of the fluorine and other volatile matter during processing and curing. This new superphosphate is very porous and can be ammoniated readily. Granular mixed fertilizers of 6-24-24 and 12-24-12 grades have been produced from it; similar formulations employing concentrated superphosphate of 48% P_2O_5 content result in product of 5-20-20 and 11-22-11 grade.

In other tests, superphosphoric acid was used directly in the continuous ammoniator to make several grades including 5-20-20, 5-20-10, 7-28-28, and 17-17-17. Some of the tests were carried out in the TVA pilot plant and other tests were made in a commercial plant. Advantages noted were that the products required less drying or no drying and that the increased heat of reaction helped granulation in some grades.

TVA has produced superphosphoric acid from time to time in its acid plant for use in its experimental production of liquid fertilizers and of concentrated superphosphate. The cost of producing the superphosphoric acid was not significantly higher than when producing ordinary acid containing 54% P_2O_5. Since superphosphoric acid is over 40% more concentrated than ordinary furnace phosphoric acid, it offers economies in handling costs. A considerable number of display and experimental samples of the acid have been given out and tonnage quantities have been shipped to several companies for experimental use in the production of solid and liquid fertilizers. Such quantities will continue to be available. The purpose of this program is to acquaint the industry with the properties and potential advantages of the acid and to encourage the production and use of the acid.★★

When an order comes in via teletype from a sales office, it is printed on a continuous form in the teletype, and also punched into a five-channel tape.

IN THE FRONT OFFICE HANDLING AGRICULTURAL CHEMICAL SALES

AGRICULTURAL chemicals concerns have been relying on automation to an increasing extent in recent years to keep production levels rising without a corresponding increase in the labor force. The next logical move for mechanization at this time is into the front office,—to relieve the pressure of paperwork, to improve record keeping practices, to establish more efficient inventory controls and to help build customer service. This article is a discussion of one of the forms of mechanization available, presenting some case studies of its application.

The Spencer Chemical Co., Kansas City, Mo., maintains plants in Pittsburgh, Kans., Calumet City, Ill., Henderson, Ky., Vicksburg, Miss., Orange, Texas, and Fort Worth, Tex. Its sales offices are located in Atlanta, Chicago, Kansas City, Los Angeles, Memphis, and New York. The company's sales have increased from $12 million to $48 million annually during the last ten years.

As a result, the company's methods of processing orders and billing, which called for liberal use of the telegraph and telephone, had become increasingly involved in recent years. To solve this problem, Spencer has installed an Integrated Data Processing system, developed by The Standard Register Co., Dayton, Ohio, which moves orders rapidly and accurately over teletype.

Integrated Data Processing (IDP) is a comprehensive procedure of originally recording information in a machine language and subsequently reproducing it for all purposes by the use of compatible machine equipment. In other words, original information is recorded on tabulating cards, edge-punched cards, or punched tape and that information need never be typed manually again. The recording medium simply is inserted in a machine and the machine translates the code into written words automatically.

By recording information in this manner, it is possible to have it duplicated automatically in any number of locations, whether a few feet or thousands of miles away and any number of times.

When one of Spencer's sales offices receives an order, it uses off-line teletype equipment to put the order on tape. To do this, a master tape, pre-punched with repetitive information for each customer, feeds its information to the equipment. Then the teletype operator manually types in the variable information from the order. The equipment combines this information on a new tape, which then is transmitted via direct teletype line to the wire room of Spencer's IDP section in Kansas City.

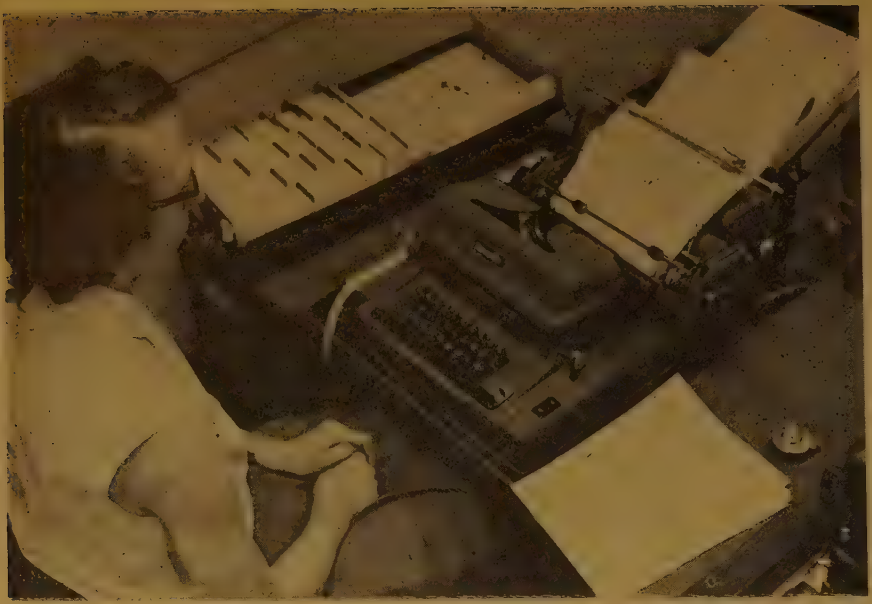
A five-part shipping-order-acknowledgment is prepared on a Flexowriter which automatically types in the information from the tape and allows an operator to type in new information originating from Kansas City, such as from which plant the order will be shipped. These forms then are transmitted to appropriate sections for action.

At Spencer, a company that handles large volumes of orders daily, the IDP system is credited with a considerable reduction in clerical costs and errors. Smaller companies, too, can take advantage of this type of automation.

An example of a medium-sized company using IDP is Eberbach & Son Co. of Ann Arbor, Mich., a dealer in laboratory supplies and equipment. The company employs about 50 people and has approximately 4,000 established accounts and a line of 40,000 items, half of which are infrequently ordered and thus not regularly carried in stock.

The company uses a tape-reading-tape-producing typewriter with an auxiliary punch. When a purchase order has been edited and checked against inventory, a machine operator prepares a seven part order-acknowledgment-invoice form. Two by-product punched tapes also are prepared, the second containing information pertaining to such items as back order quantity. After shipping information has been entered, the invoice copies are extended on a billing machine. The first tape goes to a typewriter operator who uses it to prepare a daily billing record. That same tape later is sent out to a tabulating service bureau where two decks of tabulating cards are prepared by a tape-to-card converter. These decks then can be used by the company to create various statistical records.

R. O. Eberbach, president of the firm, declares that the system "gave us a new capacity within an existing modest size office staff. We are prepared to handle a volume of 200 or



After transfering an order to a punched tape, the tape is loaded in a Flexowriter which is set up with 5-part continuous shipping order acknowledgement forms. The machine takes repetitive information from the tape, while an operator types in any new information on plant selection, rates, etc. An invoicing tape is then transmitted via teletype to the plant which will fill the order. An invoicing tape is completed after word is received that the order has been shipped, with repetitive data again supplied by the tape.

more orders a day — considerably beyond present needs." Mr. Eberbach added that his company's customer relations efforts have been simplified by good, prompt service.

Besides order entry-invoicing and purchase requisitioning-receiving, Integrated Data Processing techniques can be put to use in handling payrolls, voucher-check operations, inventory control, and several other areas. According to the Standard Register Company, the size of a company and the order volume are not the only criterions that determine the advisability of adopting IDP procedures. Such things as a company's objectives, the nature of its business, and the frequency of customer orders also should be considered.

Front office routines sometimes delay orders. This article reviews a mechanized system for rapid order handling which may fit the requirements of typical agricultural chemicals firms.

Among the factors affecting the cost of an IDP installation are the size of the proposed installation and the amount of equipment necessary. The simplest form of IDP is that in which only one machine is used. For purposes of illustration the Standard Register Company cites the tape-reading-tape-producing typewriter. In this system, punched tapes, containing the name and address and other constant information concerning each customer, are kept on file. When an order comes in, the corresponding tape is inserted in the machine. This automatically types the basic information on multi-copy forms. The tape, however, is coded to stop the machine at designated places so that variable information may be entered manually. At the same time, the machine is preparing another tape containing all information, automatic and manual.

The form copies are distributed as required and on one of them shipping information, prices, extensions, and so forth, will be entered by hand. Following shipment, that copy would be returned to the operator of the "automatic" typewriter. She then would take the second tape and prepare invoices. This is done in the same manner as preparation of the order. The tape "instructs" the machine to type all the constant information, but stops it for manual insertion when additional data is required.

The initial cost of such a set-up is approximately $5,000, depending on how much optional equipment is desired with the machine and how many forms would be involved in the operation. This simple system, however, can increase the output of typists two or three times and also insure accuracy.

The best way for a company to determine the practicability of adopting IDP techniques is to compare costs. The amount a company spends on current paperwork operations, balanced against what it would spend if Integrated Data Processing were installed, and factors such as customer service, and statistical control should be considered.

Another point to take into consideration is the nature of a company's business. Does it produce standard products or does it primarily manufacture items to customer specifications, each one being different? If the former is true, then, quite possibly, order volume could be modest and IDP still could be used to advantage. If the latter is true, however, order volume would have to be quite large to make IDP practical.

The frequency with which a customer orders products also will play a large part in any decision to adopt IDP procedures. If orders from individual customers are few and far between, IDP might not bring any benefits, regardless of volume. A company that receives several orders a year from a number of customers, however, might very well find it advantageous to consider the possibilities of recording all constant information pertaining to those customers in a manner that makes order entry and invoicing almost completely automatic.

Strictly speaking, therefore, the question of whether or not to mechanize certain office operations is one for the individual company to answer. There can be no ground rules laid down as to how much order volume is necessary or how extensive the operation need be.★★

Aromatics in the Fertilizer Industry

BECAUSE the original plant nutrients were organic fertilizers, with their own notoriously unpleasant odors,—fertilizers have often been thought of as a polite expression for "manures,"—in spite of the fact that chemical fertilizers are almost completely unrelated in color, form, or odor to their organic counter-parts. This does not imply that the chemical fertilizers have desirable scents—as a matter of fact—some (like the phosphate fertilizers) have even more unpleasant odors than the organics . . . although the physical form may be more agreeable. On the other hand, nitrogen based products usually carry a mild non-obnoxious scent, and a number of mixed fertilizers are also fairly neutral.

These esthetic considerations of fertilizer materials are becoming increasingly important to the fertilizer manufacturer. Many buyers show definite partiality toward materials which not only provide the necessary nutrients for crop life, but are also free flowing, non-caking, and at least not objectionable in odor. Perhaps the greatest potential for perfumed fertilizer, is the home garden market, commercial nursery, and greenhouse rather than the commercial farm market,—where price seems to be the prime consideration.

The problem involved in application of aromatics to commercial fertilizer is two-fold in nature: masking and reodorizing. Odorants are used to (1) simply mask an existing unpleasant odor without any requirement of adding a new one; (2) mask and reodorize to a pleasant scent, or to simply reodorize if no mask is required, (3) to add a barnyard or stable type odor to essentially odorless chemical fertilizers. Dodge & Olcott, Inc., New York, an aromatic firm which has conducted considerable research in the use of aromatics in fertilizer observes that "fruit effects" are the most widely desired,—and that odorants are used mostly to mask an objectionable odor, and add a pleasant tone.

The concentration of odorant used, varies necessarily with the type of fertilizer to which it is applied. Anywhere from 1/5 to 1/20 of 1% of aromatic additive has been used successfully, — the higher proportion has been used in fish solubles and fishmeal fertilizers, which are particularly unpleasant in odor. The 1/10 to 1/20 of 1% has been used in fertilizers consisting of urea, sludge, dried blood meal, etc. The odor applied is formulated to last as long as the unpleasant odor apparent in the untreated product. In many instances, a fertilizer does not become objectionable until it is heated or wetted. In these cases, odorants are provided that become effective at the time heat or moisture is applied. Dodge & Olcott report that they have experienced considerable success in masking odors, and are begining to receive some repeat business in this area.

In making phosphate fertilizer, the principal problem, odor-wise, arises when the rock, acid and water are heated and combined. The resulting fumes are highly unpleasant, and after this odor has evaporated another, equally unpleasant, develops and stays in the finished material. The latter odor has been described variously as reminiscent of sewage or burned garbage. Dodge & Olcott laboratories have worked on this problem for a number of concerns, and report it has been found most satisfactory to mask the sulfuric acid. They indicate odorants have been developed that will do the job, successfully in proportion of as little as 1/50%.

Odorants are sometimes added to the bag or package, but not as frequently as to the material itself. This practice is followed only if for some reason the material is extremely difficult to mask, or if the odor in the bag is so unpleasant that it would be a sales deterrent at the point of purchase. On the other hand, odor can be added to a package merely as a merchandising aid.

It is not necessary to use a different odorant in liquid and solid fertilizers. It is only necessary that they be soluble in the medium of the product. Price is probably as important a consideration as any in use of aromatics for fertilizers,—and costs vary considerably . . . with aromatic compounds selling from $2.00 to $3.00 per pound, and used as indicated previously in quantities of 1/50 to 1/20 of 1%.

Pest Control in the PHILIPPINES

THE Bureau of Plant Industry and the Bureau of Agricultural Extension of the Philippine Department of Agriculture and Natural Resources are conducting a coordinated campaign to reduce the loss of crops in that country from damage by plant pests and diseases. Such damage has been estimated to reduce agricultural production by 30 per cent at a loss of $400 million annually.

The overall program is extensive because of the geographical nature of the country as well as the crop protection problems involved. The Philippines are composed of 7,109 islands with a total land area of 114,830 square miles. The islands stretch over 1,000 miles of the Pacific, from near the northern tip of Borneo on the south to within 100 miles of Formosa on the north. The country's wide variety of crops include rice, corn, coconut, sugarcane, and abaca. Coffee, cacao, various fruits, vegetables, and others constitute the balance.

As part of its crop protection work, the Bureau of Plant Industry, through its field pest control personnel in the 53 different provinces, conducts demonstration work on the control of plant pests and diseases with pesticides. During the crop year of 1955-1956, for example, a total of 352 rice plots were maintained in 10 provinces to demonstrate spraying with Endrin or EPN to control stem borers and other pests. The two chemicals were applied at the rate of 0.6 pounds and three pounds of the active material per hectare and at spray concentrations of .03 per cent and .06 per cent, respectively. A compressed air sprayer or a power sprayer, with a spray boom attachment with 10 Tee Jet or Cone Jet nozzles, was used. The first sprayings were done when the rice transplants were about one month old and the second at least 30 days before the booting stage if serious late infestations were observed.

The sprayed plots outyielded the adjoining unsprayed areas by an average of 1,843 pounds of rough rice per hectare, thereby representing an increased yield of 43 per cent through spraying. In the following year, the work included 1,046 demonstration plots, scattered over 11 provinces. These plots produced an average gain of 1,019 pounds per hectare as a result of the spraying. The difference in the increased yields for the two years was believed to be due to the demonstrations being held mostly in the higher yielding lowland areas the first year, and the lower yielding upland areas the following year.

As a result of these demonstrations, rice farmers now are buying their own sprayers and pesticides. In one province alone, Nueva Ecija, 2,052 compressed air sprayers and 52 power sprayers were bought by farmers in a six-month period.

Recently, the University of Philippines College of Agriculture and the Philippine Coconut Administration started a campaign to control copra bugs and other storage pests in copra warehouses, particularly in the vicinity of shipping ports. Extensive studies on the spraying of clean insect-free copra with an oil-free Pyrenone formulation are being conducted. Also in progress is the cleaning and disinfecting of bodegas with the application of residual sprays of dieldrin, DDT, TDE, and methoxychlor at various concentrations. In addition, periodic space or aerial sprays of pyrenone oil-free formulation are applied, as soon as new batches of clean copra are brought in for storage and at the end of each storage month thereafter. Copra and other coconut products represent about 55 per cent of the Philippine export trade and, therefore, such protection is justified.

Corn, an important food crop that occupies about 23 per cent of Philippine crop land, is damaged seriously at times by rust, mildew, and borers, but has not as yet been brought under any extensive spray program. Protection of stored corn, intended for human and livestock consumption, from weevils evidently has attracted serious concern, however. The use of proper storage facilities, heat control, and chemicals such as PGP and Pyrenone grain protectant dust now are being investigated. An effort was made several years ago through the cooperation of the U.S. Department of Agriculture to establish parasites of the borer but it has not been determined to what extent these natural control agencies have become established.

While spraying to control fruit pests is becoming increasingly common, results from the spraying of mangoes to control leafhoppers have probably given the greatest returns in fruit produced. This work has gained more headway since the end of World War II because of the advent of new spray compounds. Custom sprayers now are using .08 per cent DDT emulsion sprays and DDT-Lindane formulations. In cases of

This review on pest control programs in the Philippines is based on a report by **Faustino Q. Otanes,** chief, Plant Pest and Disease Control Division, Bureau of Plant Industry; **J. Alex Munro,** entomologist, U.S. International Cooperation Administration, Manila; and **Jose L. Morales,** chief, Plant Pest and Disease Control Section, Bureau of Plant Industry.

The pictures are offered through the ICA (International Cooperation Administration), U.S. of America Operations, Mission to the Philippines in Manila.

simultaneous anthracnose infection, Parzate or Manzate is mixed with the spray. Usually, three or four sprayings are carried out at ten-day intervals before the inflorescence opens and one spraying is done after fruitlet formation. A power sprayer with a spray gun adjusted to a mist spray usually is used in this work. The gain due to spraying is so outstanding that custom sprayers regularly accept 20 per cent of the increased yield as payment for the application. Mango fruits worth $500 per tree recently were realized by a farmer in Rizal as a result of spraying.

Onions being sprayed with pesticides. In the background are DANR and ICA technicians studying the results of chemicals on the leaves. Photo was taken at the farm of Dr. B. Brown in Tanay, Rizal.

Spraying of corn with pesticides has been found very effective in controlling borers without hurting the plants. H. S. Custodio and Dr. J. Alex Munro, BPI and ICA entomologists, study effects of chemicals on insects.

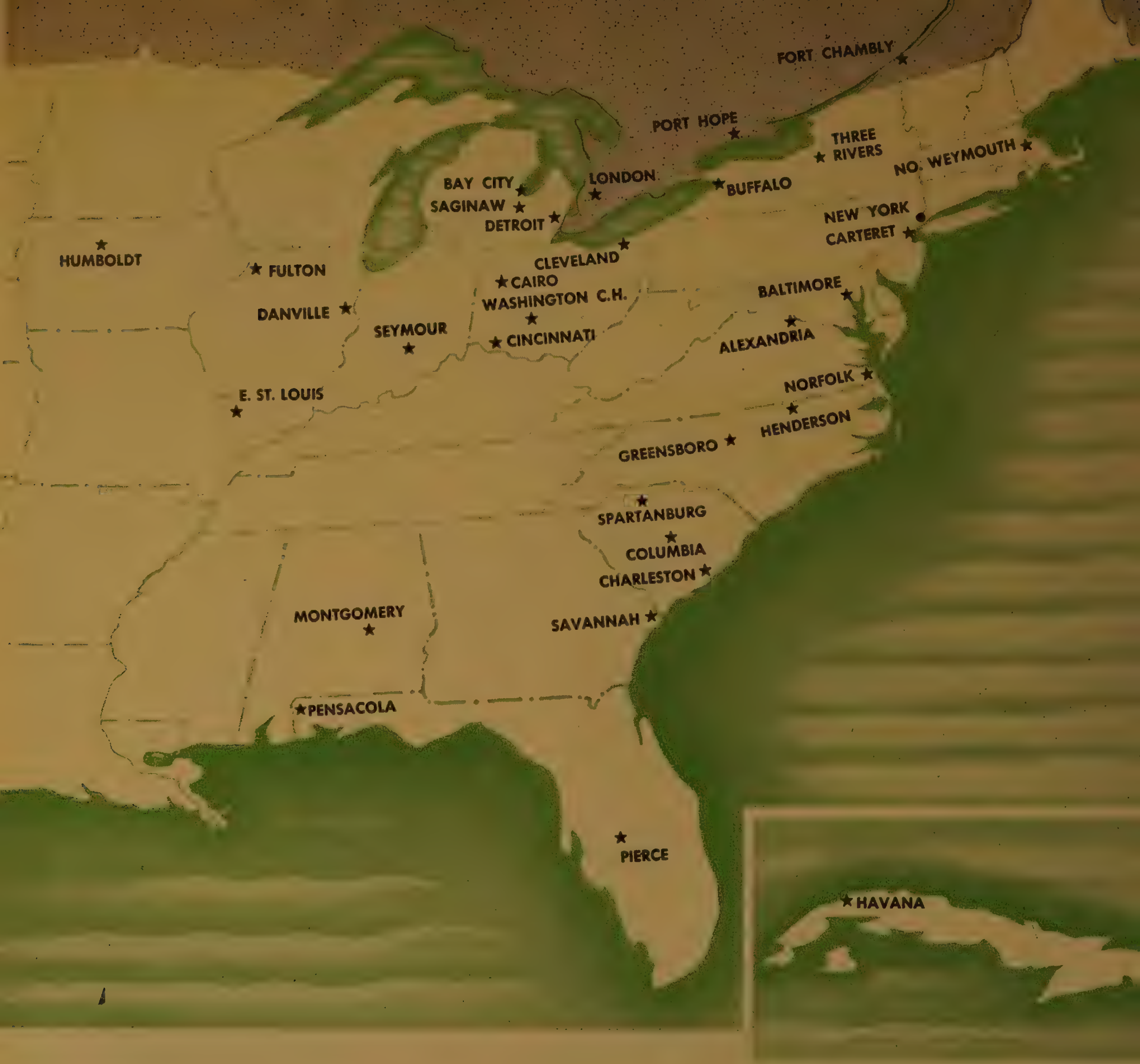
Samples of onions taken from the farm of Dr. Brown, indicate good results of proper care and timely spraying of plants.

Spraying against pests and diseases of vegetables also has gained more headway since the end of World War II because of the more effective spray chemicals. The work has been highlighted of late in the garlic and onion growing areas in the provinces of Batangas, Nueva Ecija, and Ilocos Morte where growers were losing fully half of their potental yield from purple blight and other pests. Spray demonstrations, conducted by the Bureau of Plant Industry, resulted in almost complete protection of the plantings with the result that many growers have adopted the procedures demonstrated and now are harvesting profitable yields. In this work, a combination spray of Parzate or Manzate and EPN wettable powder is applied as a protective spray, starting after the plants are a month old and carrying through at seven to ten day intervals until cessation of vegetative growth.

There is an ever-increasing realization in the Philippines of the importance of crop protection as well as the judicious application of fertilizers as means of increasing production of rice, corn, and other crops. The bureaus of Plant Industry and Agricultural Extension conduct farm meetings and crop protection demonstrations throughout the provinces. Their work has been facilitated by the formation of nearly 6,000 pest control groups. Each group consists of about six neighboring farmers whose pest control problems are somewhat in common. The members of these groups benefit both by the exchange of information and in the cooperative purchase of spraying and dusting equipment. Pesticides for demonstration purposes are distributed only to members of these pest control groups through a designated group leader.

In addition to insects and diseases, plant pests in the Philippines include monkeys, wild pigs, and rats. Extensive rat extermination campaigns have reduced rice losses in one

(*Continued on Page* 105)



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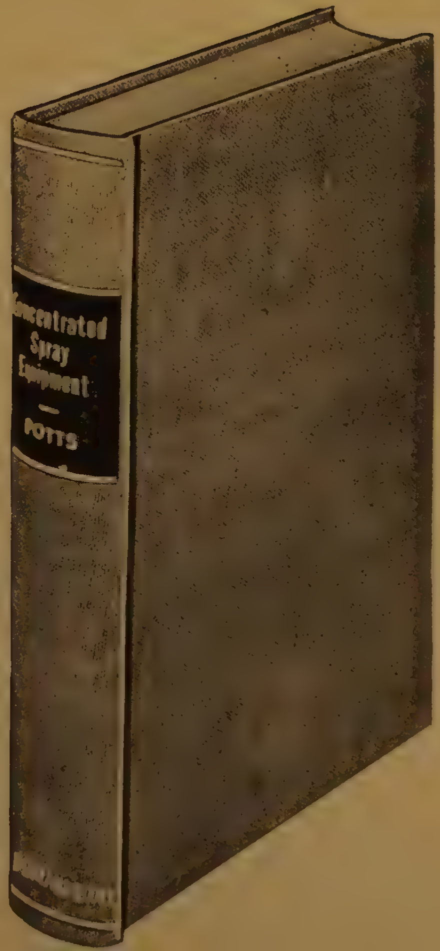
THE CUSTOM *Applicator*

- An Illinois Aerial Applicator Discusses Pertinent Questions About Aerial Custom Spray Application
- Corrosion Prevention
- Pest Control
- Recognizing the Applicator
- A New Book on Spraying



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GIVES FASTER, BETTER, COTTON DEFOLIATION

Revolutionary action gives fast leaf drop . . . cleaner harvest . . . higher crop income

The revolutionary action of DEF defoliant assures a cleaner, higher value cotton crop every time. DEF does not merely dry up leaves, it makes them fall off green, stems and all . . . produces better than 90% defoliation in as little as 5 to 7 days. This *faster, more complete defoliation* significantly increases the efficiency of mechanical harvesting and results in less trash and lint stain . . . *a cleaner, better quality, higher value harvest!*

Unlike conventional defoliants, DEF works whether or not dew is present on the plant. DEF is effective on mature, immature and terminal growth leaves. It even defoliates plants still in vegetative growth at the ends of rows.

Cotton defoliation with DEF provides the fastest, most dependable and complete defoliation available—thus it pays off in a cleaner, higher quality, more profitable cotton harvest.

HERE IS HOW DEF WORKS

TYPICAL DEFOLIATION RESULTS WITH DEF

Location	Amount DEF per acre	Days after treatment	Percent defoliation
Louisiana	**3 pints**	**7 days**	**90%**
Mississippi	**2 pints**	**5 days**	**95%**
South Carolina	**2 pints**	**7 days**	**90%**
Texas	**2 pints**	**5 days**	**92%**

DEF stimulates the formation of an abscission layer where the leaf stem joins the stalk, makes entire *leaf* and *stem* fall free of stalk.

DEF A PRODUCT OF **CHEMAGRO**

"Chemicals for Agriculture—Exclusively!"

Recognizing the CUSTOM APPLICATOR

L. S. Hitchner
Executive Secretary
National Agricultural Chemicals Association

ON behalf of NAC, I am very glad to have this opportunity to offer congratulations to AGRICULTURAL CHEMICALS for its decision to provide a new department dealing with the custom application of pesticides. This action is a well-merited recognition of the growing importance of custom application, both in agriculture and in a wide variety of public health programs, and this new department should fill a need to help in gathering and disseminating more widely the news and other information on the art and science of pesticide application.

I welcome this opportunity, also, to congratulate the custom applicators, aerial and otherwise, who deserve recognition for the notable record they have achieved in pest control. Some measure of this achievement is revealed in statistics gathered recently by Robert E. Monroe, assistant executive director of the National Aviation Trades Association.

Mr. Monroe reports that in 1951 only 38,656,000 acres were treated from the air, as compared with an estimated 60,000,000 acres this year. Dollar volume for the comparable period has jumped from $67,200,000 to $107,000,000. The number of planes in use has increased from 2,500 to 5,000. Interesting, too, is the fact that this year's larger achievement is being made by 4,000 pilots as compared with 5,000 in 1951; the number of operators this year is approximately 1,700 in comparison with almost 2000 in 1951.

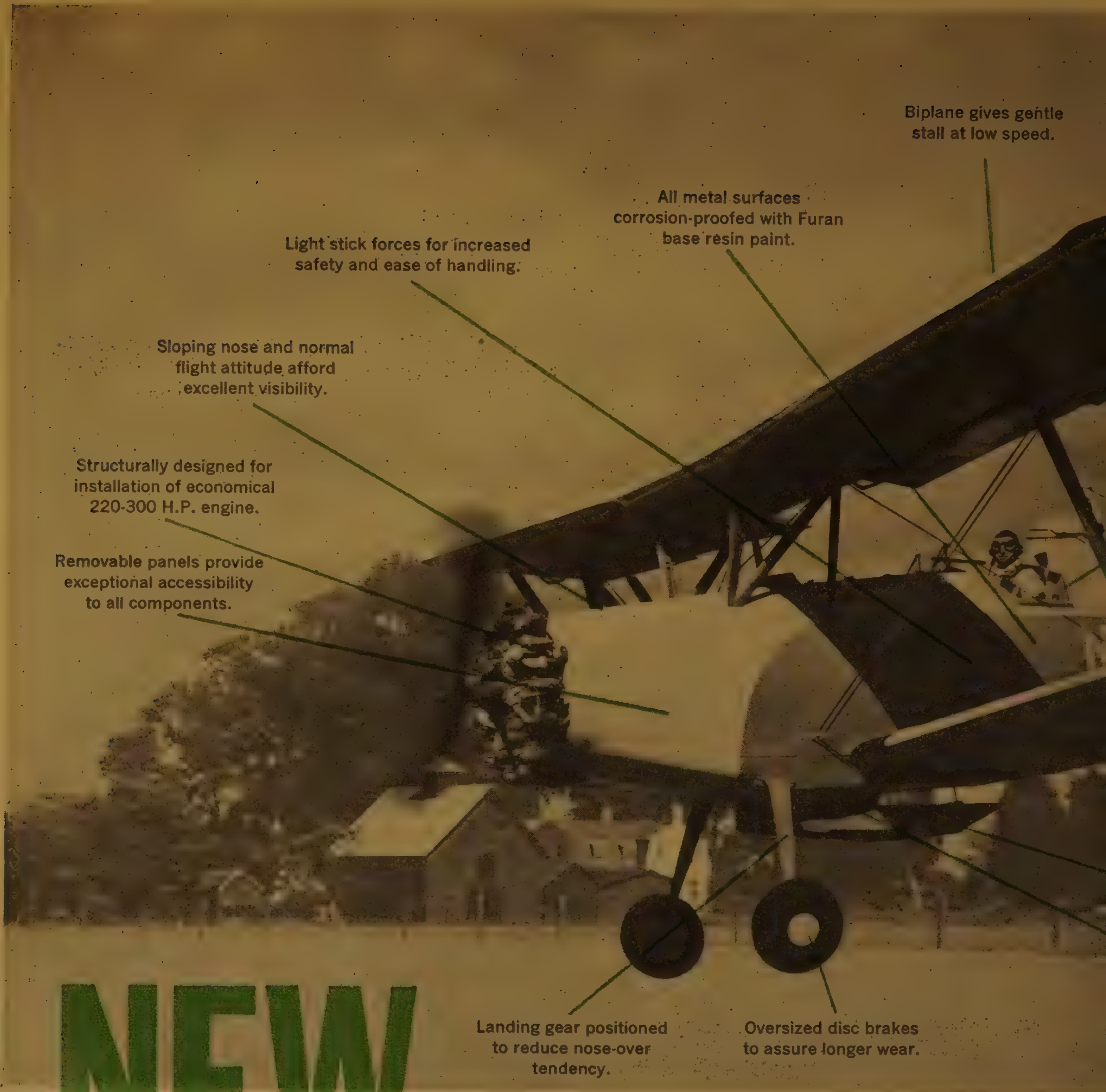
As Mr. Monroe points out, "The early crop dusting operation was pretty much a trial and error proposition." The pioneers in aerial application were pioneers in the real meaning of the term, and one has only to compare the work of a few years ago with that being done today to recognize how much they have accomplished. All this has happened because these pioneers and those involved in other forms of custom application have, by and large, taken their responsibilities seriously.

They have recognized their obligation not only to kill the pests but also to safeguard the public interest and welfare. They have learned the importance of following instructions on the pesticide manufacturer's label, and of complying with governmental regulations concerning custom application. Off season, they have spent their own time and money to attend special instructional programs set up for their guidance by the Land Grant colleges and universities.

These and other steps have been helpful indeed in making possible area-wide chemical control measures through custom application. Enlargement of such control is essential if on both the farm, and public health fronts, insects and other pests are to be controlled.

Custom applicators share with Industry generally the responsibility for taking proper precautions for the safe use of pesticides. With few exceptions, custom applicators have discharged this responsibility well. They are assuming an increasingly important role in educating the public on the essential role of pesticides in today's society.

Looking to the future, it is clear that airplane and other forms of custom application will play an increasingly important role in man's never-ending warfare against insects and other pests. NAC looks forward to continuing collaboration with the custom applicators, as well as with all other forces involved in protecting the public and the nation's food supplies against insects.★★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NEW GRUMMAN AG-CAT

Here at last is an airplane specifically designed for the agricultural operator by a major aircraft company with 28 years experience in building more than 24,000 airplanes. The Ag-Cat has all the simplicity, ruggedness, reliability and safety you want and need. The airplane, designed for quick turn-arounds, has a profitable payload of 1000 pounds of dust or liquid. A variety of power plants, including majored surplus engines are available, meaning easier, low-cost maintenance. Fuselage panels are removable in minutes for hosing out the airplane, and to provide exceptional accessibility to all components. All metal surfaces are corrosion proofed.

For complete information write: C. E. (RANDY) MOORE, AGRICULTURAL AIRCRAFT DIVISION

Interchangeable upper and lower wing panels.

All four ailerons interchangeable.

Cockpit seat, shoulder harness and safety belt stressed for 40 G's.

All control surfaces fabric covered.

Simplified rigging—no internal, and minimum external wires.

Full throat emergency dump valve empties hopper in minimum time.

Instant change from duster to sprayer.

SPECIFICATIONS

Wing span	35 ft., 8 in.
Over-all length	24 ft., 4 in.
Maximum height	10 ft., 9 in.
Maximum gross weight	3600 lb.
Weight empty	2179 lb.
Fuel	34 gal.
Oil	5 gal.
Hopper capacity	29 cu. ft., (217 gal.)
Hopper load restriction	1000 lb.

PERFORMANCE

Maximum speed (level)	110 mph
Stall speed @ 2600 lb.	42 mph
Stall speed @ 3600 lb.	48 mph
Take off distance @ 2600 lb.	330 ft.
@ 3600 lb.	675 ft.
Rate of climb @ 2600 lb.	940 fpm
@ 3600 lb.	530 fpm
Endurance (220 hp Continental @ 1750 rpm)	3 hr.

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Aerial Application Questions Answered By Illinois Applicator

Does Airplane Spraying and Dusting Really Pay?

If a farmer has an infestation of insects or weeds, an aerial application will pay him well. The farmer should study farm journals and University bulletins to learn what constitutes an infestation of sufficient size to justify treatment.

Do Many Farmers Use the Services of an Aerial Applicator?

ONE out of every six acres under cultivation in the United States is treated each year by airplane. Over five thousand planes are used for this type service in the U.S. alone.

What Types of Jobs Can Planes Do Efficiently?

Airplanes are used to apply insecticides, sow seeds such as rye, clover, rice and grasses. They are also used to spread herbicides on small grains and other weedy crops. In the great plains, millions of acres of wheat are sprayed each year by planes for weed control. Timber and rangelands are sprayed with brush killer to control noxious growths. Fertilizing is another growing phase of aerial application. Both liquid and dry materials are employed. Planes are used extensively for defoliation work on such crops as cotton, soybeans, lima beans and alfalfa.

How do Airplane Applicators Charge for their work?

Airplane work is often figured costwise on the number of pounds of material applied per hour, although in Illinois, most operators have changed from so much per pound to a flat price per acre. The price per acre varies with the poundage of materials applied. For applying two or three gallons per acre, the charge is about $1.50 per acre. At five gallons per acre, a concentration often employed in defoliation work, the charge would amount to about $2.00 per acre.

Bob Danforth
President,
Illinois Association of
Aerial Applicators

Can a Farmer get a Complete Service from an Aerial Applicator?

Most applicators in our area carry stocks of agricultural chemicals and can furnish the chemical as well as apply it for the farmer. The aerial applicator works either of two ways: he will apply your chemical if you have it, or furnish you with a "package job" if you prefer.

What about the Financial Responsibility of the Aerial Applicator?

In a recent nation-wide survey, it was found the average Aerial Applicator has twenty-five thousand dollars invested in his set-up. Some operations exceed a quarter of a million dollars. In addition to airplanes, he needs an airport as a base of operations, trucks and tanks to transport chemicals, and pumps and hoses to transfer liquids from tanks to planes. It has been estimated that for each plane in operation the aerial applicator has over ten thousand dollars invested in total equipment to keep the plane operating. Most operators carry property damage and public liability insurance to cover any possible damage claim.

Do Aerial Applicators Understand the Newer Insecticides?

Most applicators attend many meetings during the year to further acquaint themselves with the newer insecticides. One such meeting is held at the University of Illinois each January for all Custom Applicators. At meetings such as this attention is given to the newer products coming on the market, their place in general application, how to use them effectively, and precautions to be observed by the applicator. He also learns of new methods for better controlling weeds and insects with newer types of equipment. By attending these meetings, the applicator is kept well informed about the chemical tools which he uses.

Is Aerial Fertilizing Unduly Expensive?

No, it is not much more expensive, if any, than a first class job done by some other method. Planes are now being used to apply nitrogen in both the dry and liquid forms to small grains and pasture lands, twenty to fifty pounds of actual N being put on the crop per acre. Planes are used to reduce or eliminate damage to the crop which results from pulling ground equipment over the crop and through the field. This damage, which often accompanies ground application, is quite apparent during wet springs. Most times, the damage to the crop would more than pay for the plane's work. More and more farmers are using this service each year.

What About Flagmen in the Treated Fields?

Few jobs can be done efficiently without a flagman. A flagman is needed to give the pilot a reference point in the field being worked. He is a big determining factor in the quality of the work performed. He should be conscientious and step off the field exactly as directed.

Can a Pilot Get Close to the Ends Near Wires, Trees and Other Obstructions?

After completing the long swaths on a field, the pilot will make enough passes across the ends near the obstructions to get any portion of the field he might have missed in spraying the long way.

What about Wind with Aerial Application?

Wind effects will vary somewhat with different size fields, different types of materials and locations. Generally, spraying cannot safely be attempted when the wind velocity is over twelve miles per hour. Dusting can not tolerate much wind and should be done when the wind is nearly calm. The newer granule formulations seem to be particularly well adapted to airplane application and are not subject to drift as are dusts. Granules are heavy compared to dust, and can be applied in winds up to ten miles per hour.

Illinois association works to keep standards of aerial application up

EXCEPT for the protection of cotton, aerial application of pesticides had not developed to any important extent prior to World War II. Aerial applicators were not always too dependable, their personnel was largely inexperienced, and this inexperience applied to the materials they were supposed to apply as well as to the planes they operated. Because of these factors there was considerable misunderstanding of and dissatisfaction with their operations not only on the part of the few farmers who did employ their services, but also on the part of their neighbors whose crops were sometimes damaged unintentionally.

The aerial application business got a big impetus at the end of the war when thousands of surplus military planes were disposed of by the government, some of which, incidentally, made excellent spraying and dusting aircraft. And with the tapering off in demand from the military for war planes, airplane builders became understandably more interested in designing and building planes for aerial applicators.

In the fall of 1947 several aerial applicators in Illinois, feeling that it might be wise to form an association among applicators, called an organizational meeting at the University of Illinois airport at Champaign. Nearly one hundred interested persons attended this meeting. Many were former service pilots who were interested in buying airplanes and getting into the aerial application business. About fifteen of those present were already active in the applicating business, operating airplanes in the state.

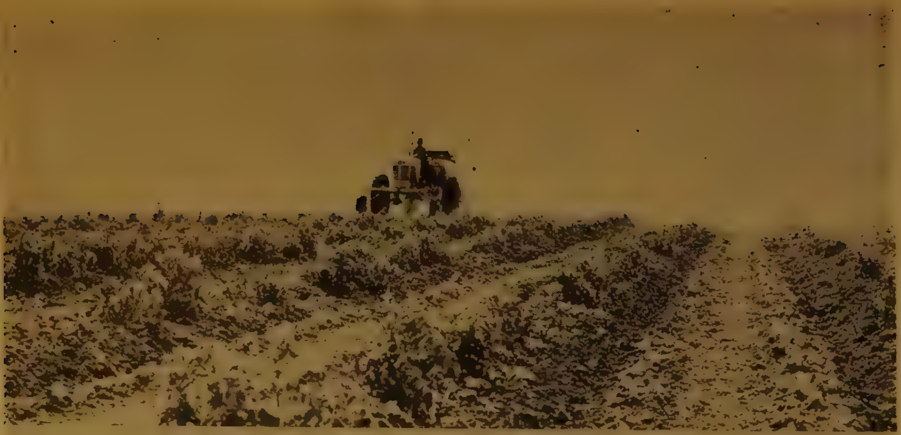
In the spring of 1948 another meeting was held at which time the Illinois Association of Aerial Applicators was formed. The original membership was about thirty. Only two of these original members, incidentally, are still actively engaged in airplane application now. Ten of our present members have been operating nine years or more, some not joining the association until recently.

Our state association holds its annual meeting at the University of Illinois during the month of January. Our meeting precedes by one day the annual Custom Spray Operators School conducted by the University. At our meeting we discuss regulations which might be pending, insurance problems, public relations, better safety precautions and practices and other general problems of the industry. At present we have no special regulations for aerial applicators in the state other than the provision that shoulder straps be worn in the aircraft and fire extinguishers be available at the loading area.

Our biggest project to date as an association was completed last January. With the cooperation of all members the association published a thirty-two page illustrated booklet on Aerial Application. It covers twenty one of the questions asked most frequently by farmers about aerial application, and describes briefly ten of the most common insects in Illinois, methods of combatting them and pictures of each.

Our Illinois Association feels it has done much good in maintaining and improving the high standards of aerial application work over the past decade. Through conscientious effort and better understanding with the farmer we will continue to progress.

Bob Danforth, president of the Illinois Association of Aerial Applicators, is owner of an airplane applicating service in Monmouth, Illinois. Les Gilbert is the vice president and Lillard Hedden is the sec.-treas.



Pest Control at B & L Farms

B & L Farms Co., South Dade County, Florida, is among the country's largest tomato farms and supplies tomatoes for the fresh market exclusively.

Robin I. Bryant and Clarence A. Lounsbury, principals of the company, supervise all details of the operation. Tomato fields are laid out in mile-square plots. Each 640-acre area is subdivided into 16 blocks with 44 rows spaced 7 feet apart.

Helmut K. Dressler is horticulturist for the operation, and an intensive spray program is an important factor in the production of uniform fruit of high quality. Tomato leaf miners are controlled with regular applications of Diazinon (product of Geigy Agricultural Chemicals Division).

B & L spraying equipment is of two types, boom and air blast. Sprayer tanks have a capacity of 500 gallons. Air blast types are designed to spray 14 rows at a pass, and make a one-mile run before refilling.

Between each pair of blocks is a 20-foot irrigation and field access road. Wells sunk along these roads every 330 feet supply water both for irrigation and spray mixing.

Spray powder supply trucks are parked at row ends in the access roads. As each sprayer completes its run, the operator drives to the nearest well, fills the tank with water, then proceeds to the waiting supply truck. There, pre-measured and bagged spray

materials are added to the water in the tank and, in a matter of minutes, it is away for the next spray run. Automatic agitators keep the spray thoroughly mixed at all times.

When fields are too wet to permit use of the heavy spray equipment, B & L uses the services of James E. Holland, Jr., veteran South Florida spray plane operator. Flying in a Super Cub or a Stearman, Holland's planes are equipped to spray, dust, or fertilize from the air.

Because of its relatively low toxic action, Diazinon is particularly suited to air blast spraying, where label directions are followed. Its usage at B & L is a step toward their goal of utmost safety. To attain this objective they select the least hazardous materials to safeguard both workers and products.

Photos top left:
Complete plant coverage with pesticides is obtained at B & L Farms with air blast sprayers. The air blasts the spray low in the seven-foot apart rows, covering 15 rows at a time.

Left, bottom:
Helmut K. Dressler, horticulturist, B & L Farms, Princeton, Fla., above, checks tunnel in tomato leaf which is opening that admits fungus infection.

This page below:
Wells are sunk along irrigation and field access roads every 330 feet at B & L Farms. Three irrigation pumps are in upper right. Tomatoes, planted in 7-foot apart rows, are banked high, as the soil is rocky and thin in that area of Florida.

This philosophy was also put into practice when the B & L spray and fertilizer warehouse was located at some distance from the packing operations. Spray formulations for use at B & L are supplied by the Woodbury Chemical Co., Goulds, Florida, under the supervision of manager Richard R. Hutchings.

Tomato production in Southern Dade County is unique in many respects—pickings extend from November to May, for example. Also, the soil is principally coral rock land, varying in depth from two to six inches. Further, the subsoil is rock atop a layer of bedrock. Fresh water abounds at depths of from one to six feet.

Irrigation wells driven into the rock require no casing. A cement collar is cast around the well mouth, and a post is inserted to mark its location. B & L irrigates mostly at night from wells driven to a depth of slightly more than 20 feet. Daytime water evaporation runs as high as 40 per cent, and water temperatures average 72°.

Insect propagation in Southern Dade County also is unique. Nolan L. Durre, assistanty county agent, sums it up by stating: "A pest in the North can become a disaster in Florida!"

Durre's statement proved true late in 1957 when serpentine leaf miner damage became acute. Sprays previously effective failed to give control. In December, 1975, Durre's office issued a recommendation for Diazinon application.

It called for the use of 25% wettable powder at the rate of one pound per 100 gallons of spray, or one pint of the liquid containing two pounds of toxicant per gallon of emulsifiable concentrate per 100 gallons, both to be combined with maneb.

Dr. D. O. Wolfenbarger, University of Florida entomologist, at the Sub-Tropical Experiment Station, Homestead, Florida, conducted the studies on leaf miner control with Diazinon which resulted in the Florida recommendation. Tests were launched by Mr. Dressler of B & L during this same period with favorable results.

Nationally, the *Federal Register* in December '57 published a tolerance as established by the Food and Drug Administration for use of the product on tomatoes, cabbage, cauliflower and broccoli for the control of aphids, flea hoppers, and serpentine leaf miners.

A residue tolerance of 0.75 ppm was established for diazinon at that time, and label claims for application to tomatoes as late as 3 days prior to picking were approved. Clearance was given for the material as a spray or dust to be applied to cabbage up to 7 days before harvest, and to broccoli and cauliflower up to 5 days before harvest.

These studies considerably broadened potential uses. Claims for control of potato insects had been accepted previously, and residue tolerances established on apples, pears and cherries. Data are now being compiled prior to requesting the Food & Drug Administration to establish residue tolerances on a number of additional crops.

Mr. Dressler of B & L farms is particularly pleased with the distribution and leaf coverage which he has been getting. He estimates that insect-transmitted virus infection can reduce tomato production by as much as 25 to 30 percent. Through both field tests and laboratory research, B & L is endeavoring to increase crop

(*Continued on Page* 105)

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The Economics of Corrosion Prevention

At a joint meeting of the pesticides and corrosion groups of the Society of Chemical Industry in London, Feb. 17, R. J. Courshee presented an address on "Corrosion of Spraying and Dusting Machinery."

This article is taken from those remarks of Mr. Courshee that pertain to spraying and dusting equipment used by custom applicators.

MANUFACTURERS of sprayers and dusters are able to design at reasonable cost machines which are adequately resistant to almost all the agricultural chemicals applied through them. Despite small problems, therefore, such as occasional failures of well established copper-bearing alloys and of certain grades of plasticized P.V.C. and thermo setting resins, corrosion-proof sprayers and dusters are a reality. As a result, a study of corrosion prevention resolves itself into a study of the economics of corrosion proofing procedures rather than the mechanics.

Corrosion has a dual effect on sprayers. It causes machines to block or break down during their normal working life and it shortens that working life. It is profitable to proof all the components of a sprayer, usually, but profitable only to such a small extent that manufacturers and farmers often do not bother. Whether or not corrosion prevention is needed, therefore, depends upon a number of factors.

For the spray contractor, speed, continuity, and certainty of getting the work done are the predominant criteria. To him, therefore, delay caused by corrosion is important. At reasonable cost, he must keep his machines working the whole of a short season and on schedule as far as possible. He is not concerned with corrosion's increasing his machinery costs, but he is very concerned with its interfering with his getting through the work. As a result, increased capital investment for corrosion prevention is of little significance and the value of avoiding breakdowns great.

The capital cost of a sprayer to the custom applicator is relatively small per acre when compared with a privately owned sprayer that may be used only a comparatively few times before breaking down. In the hands of a contractor, a machine may make 10,000 acre applications during its working life.

Opinions concerning the merit of corrosion prevention are varied. Depreciation costs per acre are possibly highest, no matter how low the capital investment, when a machine does very little work. It is then economic to guard against corrosion deterioration during storage, providing this is a principal factor causing deterioration. At the other extreme, when a contractor is using a machine hard, depreciation costs per acre are probably lowest. Also, there is every need to control corrosion deterioration during storage and in work with faultless reliability. Between these two extremes lie the majority of users to whom corrosion proofing is of less value.

While some delay in introducing corrosion prevention is accounted for by the lack of a widespread knowledge of its existence and values, there is also some lack of concern with corrosion. This usually is backed by valid economic considerations for either capital outlay or depreciation per acre costs. If corrosion proofing costs very little extra, on a per acre basis, it should be accepted. However, since to those who look after their machines properly, corrosion is not often more than a minor nuisance, per acre machine costs should be studied carefully before a choice is made.

This article has tried to strike a balance between an all-out move towards corrosion proofing of sprayers and dusters and a complete neglect of subject and may have given the impression that corrosion prevention of sprayers is of little more value than the corrosion prevention of plough shares. In concluding, therefore, a few instances are listed where corrosion prevention is essential and, furthermore, that justify improvements on standard practice.

A major inconvenience caused by corrosion is blockage and it is dangerous to spend much time unblocking and cleaning contaminated sprayers. Because small orifice nozzles are used in small volume spraying, and because concentrates often are quite corrosive, small volume sprayers require good corrosion proof-

(Continued on Page 105)

. . . now 6 Geigy agricultural

SIMAZINE* 50W *herbicide*

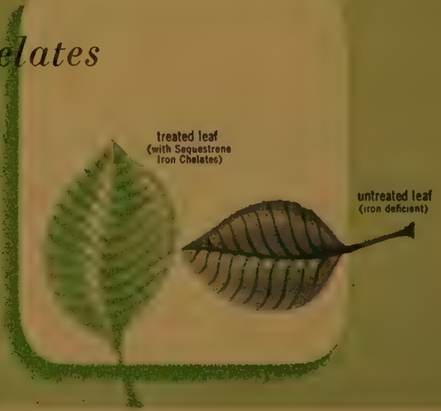
New pre-emergence herbicide for use on corn. Applied pre-emergence, one application of Simazine 50W gives corn growers effective season-long weed control. Geigy scientists feel that 100 bushel corn is now possible with little or no cultivation. Simazine 50W is also recommended for use as a pre-emergence herbicide on nursery stock. Simazine 50W has extremely low toxicity to humans and animals, and little or no foliage toxicity minimizing drift hazard. It is non-corrosive, non-irritating to skin, non-abrasive to equipment. Used as a non-selective herbicide at higher dosage rates, one application of Simazine 50W is effective for year-long industrial weed control without lateral leaching. Simazine 50W is non-flammable, and not a permanent soil sterilent.

*"SIMAZINE" is a trademark of Geigy Chemical Corporation.

SEQUESTRENE* *metal chelates*

Sequestrene iron chelates are the original metal chelates in the field of agriculture. Designed for correction of iron deficiency (chlorosis) in ornamentals, fruit trees, vegetables and turf. Completely water soluble, and may be applied as soil applications or foliage sprays. Compatible with most commonly used insecticides, fungicides and fertilizers. There are Sequestrene iron chelates for use on acid soils and for use on alkaline soils. Sequestrene Na_2 Mn Manganese Chelate and Sequestrene Na_2 Zn Zinc Chelate are also available.

*"SEQUESTRENE" is the brand name for metal chelates sold by Geigy Agricultural Chemicals, Division of Geigy Chemical Corporation.


treated leaf (with Sequestrene Iron Chelates)
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Safe, effective miticide for control of various species of mites on apples, pears, and other fruit and agricultural crops including almonds and walnuts. On citrus, controls citrus bud mite, citrus flat mite, citrus rust mite. Also effective for controlling mites on ornamentals and nursery stock including azaleas, holly, spruce and others. Applied as a spray to shrubbery and lawns around dwellings, Geigy Chlorobenzilate is especially effective in controlling clover mites. Long residual action, compatible with most commonly used insecticides and fungicides, relatively non-toxic to bees in field applications.

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Geigy Diazinon is one of the most effective, economical and versatile insecticides available. It provides long residual fly control in dairy barns; only 2 or 3 residual sprays are required per season. It is effective for multiple insect control on a variety of fruit and vegetable crops and for residual fly control in food processing plants. It has been used for more than two years by PCOs as the preferred insecticide for control of resistant and non-resistant roaches, ants, flies, silverfish and other insect pests inside buildings, and by sanitation engineers in industrial plants and public housing. Diazinon may also be formulated in ½% concentration for household use in over the counter aerosol sprays.

METHOXYCHLOR *formulations*

Multi-purpose insecticide. Low toxicity to humans and warm-blooded animals. Long residual action against many species of insects attacking fruits, vegetables and forage crops. May be applied to many crops up to 7 days before harvest. Residual sprays of Geigy Methoxychlor applied to empty grain bins are effective in controlling many insects of stored grain. Direct application of Methoxychlor as a spray or dust may be used on livestock other than dairy cattle for effective control of horn flies, cattle lice and ticks. On dairy animals, direct applications of Methoxychlor "50" as a dust may effectively be used for the same purpose.

GEIGY DDT

Originated by Geigy, DDT insecticides have become a standard means of insect pest control throughout the world. DDT insecticides are economical and have long residual action. They are effective in controlling a wide range of insects on ornamentals, vegetables, fruit, and livestock. DDT insecticides are also used for control on many cotton and forest insect pests.

ORIGINATORS OF* Geigy *DDT INSECTICIDES

GEIGY AGRICULTURAL CHEMICALS
Division of Geigy Chemical Corporation
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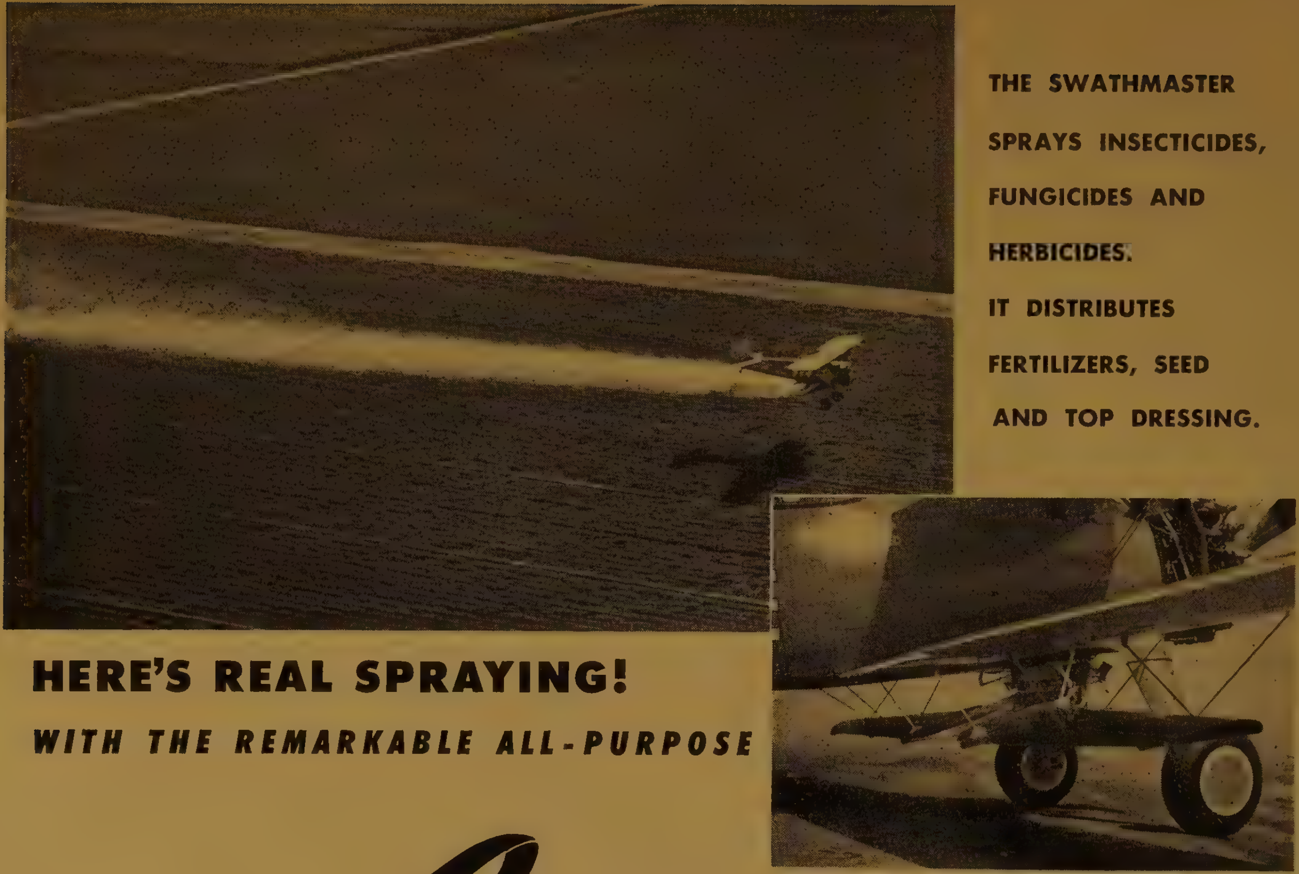

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Real spraying is easy with a Swathmaster-equipped airplane because it can lay a full and even swath at *1 gallon per acre* and, with a simple resetting of the pilot control, put out *180 gallons per acre* on the next job!

And when the next assignment calls for high or low density dust, seed or pellets, the pilot again resets his control, loads and takes off without any dispensing equipment change-over.

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The all purpose Swathmaster is a corrosion resistant stainless steel, airfoil-like structure. It completely eliminates pumps, valves, booms, nozzles and special spreaders and the mechanical problems that are normal to these items.

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PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

White Grubs Damage Range in Kansas

WHITE grubs, the larvae of the May beetle group, have caused considerable damage to range grasses in the "flint hills" area around Manhattan, Kansas. Probably three or more species of *Phyllophaga* are involved in a spotted infestation covering approximately 500 square miles in Geary, Wabaunsee, Riley and Pottawatomie Counties. It is estimated that 25 percent of the rangeland in the area involved carries an infestation ranging up to 8 per square foot. Infested spots vary in size from very small up to 80 to 100 acres, with the expectation that the damaged areas would be extended. Control by ranchers is underway. Granular aldrin and heptachlor are being recommended.

Grasshopper Program Progresses

THE grasshopper control program reported in last month's issue of *Agricultural Chemicals* is progressing satisfactorily. As of July 8, a total of over 4,800,000 acres of roadside, range and idle lands had been scheduled for the cooperative control program in 55 counties in Colorado, Kansas, New Mexico, Oklahoma and Texas. More than two million acres have been completed, and to the July date very little damage to crops had been noted.

European Corn Borer Damaging Corn in Alabama

REPORTS received in late June stated that first generation European corn borers were causing the most severe damage ever observed in early corn in the Tennessee Valley of Alabama. As evidence of the continued spread of the pest in the state, a larva was collected June 22 for the first time in Randolph county which is in east central Alabama. The borer was extremely heavy in the eastern and southeastern areas of Arkansas, with one Desha county field of tasseling corn having 60 percent of plants showing signs of feeding. The insect was also reported on corn in Bolivar and Oktibbeha counties, Mississipp.

The corn earworm was on the increase in early field corn in western Sussex county, Delaware by late June, and was causing some damage to peanuts in Sussex county, Virginia. In north central Alabama, approximately 100 percent of the ears of early maturing corn was damaged by the pest which was continuing to increase in numbers in both the northern and southern parts of the state. The insect was heavy in east central and northeastern Oklahoma. In New Mexico the corn earworm was causing considerable damage to corn in most areas of the state.

The chinch bug caused damage to crops in several states during late June. Corn and sorghum were damaged in eastern Kansas with replanting necessary in some untreated fields in Republic and Cloud counties. Populations were medium to heavy in most corn and sorghum fields in east central and central Oklahoma and in local areas of Texas. In west central and southwestern Missouri, small corn, sorghum and Sudan grass was being damaged severely. By the middle of June, movement from small grain to corn was underway locally in North Carolina with some damage reported.

SUMMARY

- ★ **Massachusetts, New Jersey, Indiana, Michigan,—report increasing aphid activity**
- ★ **Heavy corn borer damage in Alabama, sections of Arkansas, Oklahoma, and New Mexico**
- ★ **Aldrin and heptachlor suggested to curb white grub infestations in Kansas**
- ★ **Plum curculio heavy in Louisiana and Georgia**
- ★ **Bollworms causing most damage of any pest to cotton**

Aphids Active on Fruit

BY late June, aphids were increasing rapidly on apples in Massachusetts and New Jersey. The insects were abundant in numerous orchards at Vincennes, Indiana, and were especially noticeable on water shoots of apples at Coloma, South Haven and Grand Rapids, Michigan. Earlier in

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June, damage was reported from the Carbondale, Illinois, area.

Orchard mites were building up rapidly by late June in the Orleans, Indiana area, and were on the increase in the Wooster, Ohio section where controls were not applied. The pests were very serious in some Oconee County, South Carolina, orchards. At Carbondale, Illinois, the European red mite was generally present and increasing.

Heavy infestations of the plum curculio were reported from Sabine Parish, Louisiana and emergence was heavy at Fort Valley, Georgia. The insect continued active around the middle of June in all fruit growing areas of Michigan and was apparently more important in northern Illinois than normal.

Other Insect Activity

BOLLWORMS were perhaps causing the most damage to cotton of any pest in late June and early July. As a whole, cotton insects were not as serious a problem as in many past seasons. In most Alabama cotton fields, bollworms were a problem, with populations ranging from medium to heavy. Older cotton was being damaged in Tennessee and in fields near Peoria, Arizona. Fleahoppers were building up in parts of Oklahoma, and causing damage in parts of South Carolina, Tennessee, Texas and New Mexico. Lygus bugs were heavy in Imperial County, California and causing more damage in Mississippi than all other cotton insects combined. Boll weevils, by the first of July, had not been reported as being an extremely severe problem in any state.

Among the truck crop pests, perhaps flea beetles were causing the most widespread damage. These insects were heavy in parts of Rhode Island, West Virginia, Pennsylvania, Alabama, Wisconsin, New Mexico and Idaho, as well as other areas. The Mexican bean beetle was more abundant than usual in the Pee Dee area of South Carolina. Damage was on the increase in several central and northern Utah counties. Extensive damage was being inflicted to pinto beans in some New Mexico sections.★★

LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Control of Broomrape on Tomatoes With Methyl Bromide

STEPHEN Wilhelm, Lee C. Benson, and James E. Sagen* of the University of California report studies on the control of broomrape by soil fumigation. Broomrape, *Orobanche ramosa*, is a flowering plant belonging to the snapdragon family. It is parasitic on the roots of many plants and has become a serious pest in tomato fields in Alameda County, California. Fruit bearing is greatly reduced when tomato plants are heavily parasitized at an early growth stage. The broom rape plant produces myriads of very tiny seeds that are stimulated into germination by substances produced by the host roots, but remain dormant but viable in the soil for a long time in the absence of a host. Control is a difficult problem.

So far as known, no tomato variety is resistant. In their studies, the authors found the San Marzano, Red Top, Early Pack, Ace, and Pearson varieties all to be susceptible. Pearson, and the John Moran variety which is used extensively in the broomrape infested region, appeared to be damaged less severely than the other four varieties.

During 4 years of investigations, Benson's earlier discovery of the effectiveness of soil fumigation with methyl bromide for destroying seeds of the parasite was confirmed, as well as the ineffectiveness of other materials tried.

Besides the "short-range" approach to control, by chemical fumigation, the authors tried "long-range" measures such as cultural practices, rotation, and soil amendments, separately and in various combinations. These did not give satisfactory results and are omitted from this account.

The authors list briefly several other chemicals that were tried but not found to be effective. These unsatisfactory materials are also omitted here.

Methods: Tomato plants were used as indicators of the presence of broomrape in the various treatment plots.

In 1955, about 5 acres (150 by 1400 feet) of land in an area known to be infested was allotted for the experiments.

Before the tests 210 samples, each from about ⅓ square foot of soil at different places throughout the plot, were planted to tomatoes in the greenhouse, two plantings in succession being made. In the first planting the number of broomrape plants was 1 to 96 (mean of 22) per sample from 97.6 per cent of the samples. In the second planting, the number of broomrape plants was about the same. These results indicated an average of 132 or more viable broomrape seeds per square foot of soil. The authors consider this a low estimate, since in subsequent tests a third planting of tomatoes in infested soil samples produced as many broomrape plants as the first planting.

After sampling, the experimental area was divided into plots 50 or 100 feet by 125 feet and tomato transplants were planted in rows 5 feet apart, plots and rows being perpendicular to the long side of the area. The land was irrigated from a head ditch along the entire 1400-foot length. To prevent introduction of broomrape seed with irrigation water the ditch was made on land previously fumigated with methyl bromide, and water was brought to it by underground pipes. Cultivation was in the direction of the tomato rows. A 13-foot wide nontreated check along the entire length of the experimental area cut across one end of each plot; besides this check there were other nontreated plots.

Treatment effectiveness was determined by number of broomrape plants in plots in which occurrence was reduced enough to make digging out, and recording all the broomrape plants feasible. Counted plants were removed from the plots before the seed matured.

As regards tilth and moisture, the silty clay loam soil was in seedbed condition when fumigants were applied. Moisture varied from 12 to 18 per cent on a dry weight basis at different times, and from the soil surface to 6 inches deep. Field capacity was estimated at 21 to 25 per cent. Soil temperature varied between 12° and 15°C at the 6-inch depth; under the tarpaulins temperature increased slightly.

Application of Methyl Bromide through Heated Copper Coils

1955: Methyl bromide at 0.5 and 1 pound per 100 square feet of soil was used on 100 x 109-foot plots in

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*Stephen Wilhelm, Lee C. Benson, and James E. Sagen, "Studies on the control of broomrape on tomatoes. Soil fumigation by methyl bromide is a promising control," *Plant Disease Reporter* vol. 42, no. 5, pages 645-651. May 1958.

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treatments replicated twice. Application was through heated copper coils, under 4-mil thick polyethylene tarpaulins 33 x 120 feet. Straw-filled burlap sacks held the tarpaulins above the ground, and the edges were covered about 6 inches deep in the soil. Evenly spaced polyethylene hose distributed the chemical under the tarpaulins, which were left on for at least 20 to 24 hours after treatment.

Control at the 0.5-pound rate was highly significant, but not enough for detailed counts.

In the two plots treated at the 1-pound rate, counts of broomrape plants at four different times totaled 150 in one plot and 165 in the other. These totals included, 80 to 72 broomrape plants, respectively, in the edge rows or in places puddled by rain during application of the chemical. It was considered better to discard the marginal plants in interpretation of results and use only the net figures, 70 and 93 broomrape plants per plot. On this basis, the number of broomrape plants was reduced to fewer plants in ¼ acre of treated soil than in 1 square foot of untreated soil. Tomato plants were more vigorous in treated than in untreated plots; the authors believe this effect to result from something more than just the control of broomrape.

Application by Mechanical Blower and Circulator, 1956

Before the gas was applied by a mechanical blower and circulator(developed by the N. A. Maclean Corporation) the soil was listed into alternate furrows and ridges. Polyethylene covers were supported by the ridges. Plots 122 x 32 feet, the size of the tarpaulins, replicated twice, were treated with methyl bromide at 0.5, 1, and 1.5 pounds per 100 square feet. Each dosage gave excellent control which carried over to the following year. Results indicated better distribution of the gas by the mechanical circulator than by the method used in 1955. Contamination from outside sources may have increased infestation in the second year.

Tractor chisel equipment was used to apply a mixture of methyl bromide and kerosene, equal parts by volume, to five 16 x 122-foot plots numbered respectively 10A to 10E, at rates of about 160, 160, 220, 220, and 440 pounds actual methyl bromide per acre. Chisels were spaced 12 inches apart; injection depth was 6 to 8 inches. Plot 10A received 160 pounds of methyl bromide in two separate 80-pound applications 1 day apart, the soil being rotovated just before the second application. Plot 10B, treated at the 160-pound rate, was rolled immediately after treatment. Plot 10C (220-pound rate) was water-sealed. Plot 10D (220-pound rate) was covered with a polyethylene tarpaulin with the edges buried in a furrow. Plot 10E (440-pound rate) was rolled. Only Plot 10D was completely free from broomrape. It appears that, if the treated soil is covered at once with gas-proof tarpulins, chisel application of methyl bromide will give good results.

1957 Experiments with a Commercial Methyl Bromide Preparation

Weedfume, a commercial methyl bromide solution (approximately 70 per cent by weight of methyl bromide) was applied at rates of about 150, 200, 250, and 350 pounds of actual methyl bromide per acre to twice-replicated plots. Tratcor equipment was used with chisels spaced 12 inches apart. Immediately after treatment, the soil was rolled and covered with polyethylene tarpaulins, with edges sealed in the furrows. The covers were left on for 20 to 24 hours.

In another series, Weedfume was applied on two successive days without covering. The soil was plowed just before the second application. It was thought that when the treated soil was not covered, broomrape seed would probably be killed below 2 inches but not at the surface, and the plowing was done to turn under the surface soil and expose it to the second application. Control from the split treatment was substantial but less than from the single covered application. In addition, covering the soil with tarpaulins costs less than the methyl bromide needed for two applications of split treatment.★★

Request diBromide Tolerance

The Oregon State Department of Agriculture and Oregon State College have requested that action be taken to permit the use of ethylene dibromide as a fumigant on cherries.

They have furnished data indicating that residues from use of ethylene dibromide as a fumigant to control the cherry fruit fly include both inorganic and organic bromine compounds and do not exceed 25 ppm of total combined bromine.

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New Parasiticide for Botflies

Dimethoate, a new experimental parasiticide, has demonstrated marked efficiency in controlling nasal botflies that attack sheep, according to U. S. Department of Agriculture researchers. The chemical is not yet available to livestock raisers, and its general use has not been recommended.

Injected into the muscles of sheep at a rate of 25 milligrams per kilogram of the animal's weight, this systemic organophosphate compound produced an overall kill of 97 per cent of nose bots (*Oestrus ovis*) in USDA tests.

Thirty-one out of 60 infested sheep were treated with the new chemical by H. O. Peterson, parasitologist of USDA's Animal Disease and Parasite Research Division, who is stationed at Albuquerque, N. Mex. Dr. Peterson found that a single injection of dimethoate killed 98 percent of grubs in the first instar stage, 97 percent of second instars, and 92 percent of the third instar grubs.

No toxicity from the chemical occurred in any of the treated animals. Selection of the dosage was made after six preliminary experiments.

Dimethoate's effectiveness against botfly grubs in the second and third instar stages is especially notable, USDA scientists say. The only other organophosphate systemic tested—ET-57 (Trolene)—was about as effective as dimethoate against first instar grubs but had little action on older instars.

Dimethoate was discovered by industry chemists and was originally intended for use against cattle grubs. However, it has not proved as safe or efficient as ET-57 for cattle-grub control.

A New Book Should Be Of Value To Aerial and Ground Applicators

Concentrated Spray Equipment, Mixtures and Application Methods, by Samuel F. Potts. Published by Dorland Books, Caldwell, N. J. 598 Pages, Price $12.50.

The application of agricultural chemicals in the form of concentrated sprays has become big business. In North America alone during the past seven years, an aggregate of over 150 million acres have been treated with concentrated sprays and as much as 30 million acres now are being treated annually.

This book is designed primarily to supply potential users, manufacturers, and distributors with general and concise information on the principles involved in the construction and use of ground and aerial equipment. It should be of particular help to research and extension workers and county agents, and will be useful in the preparation of spray schedules.

Essential information on mixtures is included that contains the requisites of application, phytotoxicity, and compatibility. Also discussed are methods of preparation, dosage, concentration, gallonage, combination sprays, formulation for specific pests, wetting, spreading and adhesive compounds, and sources of supply for chemicals and equipment.

The terminology peculiar to the subject is clarified in a first chapter that forms a basis for the information and illustrations that follow on equipment, formulations, and methods of operation.

The book does not give an extensive bibliography and discussion of articles that have appeared in many publications on the subject but it does give the more important findings of certain workers, and references are made to these investigators and their work throughout the text.

The many diverse phases of agricultural chemicals, application equipment, and the agriculture to which they apply are dealt with in detail. A vast amount of new information is presented and the text is rich with new ideas and suggestions.

This book would seem to be especially valuable to custom applicators because of its complete coverage of the broad field of concentrated spray application. The fundamentals of application are discussed in detail. More than 250 pages are devoted to aerial and ground spraying equipment and a separate chapter discusses aerosol insecticides and dispensers. Other topics covered in the book are: methods of mixing and formulating insecticides and fungicides; controlling weeds and woody plants; and application fundamentals.

The author, Samuel F. Potts, has been with the U. S. Department of Agriculture since 1921 and much of the information in the book is drawn from his own experiences as a pioneer of the idea of applying highly concentrated sprays in finely atomized droplets.

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Fertilizer Views and News

By Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

Further Notes On Trace Elements In Plant and Animal Nutrition

MINOR nutrient elements, so-called, as distinguished from the major elements nitrogen, phosphorus and potassium, are all too often considered as relatively unimportant in crop and animal nutrition. Perhaps the designation "minor elements" may be somewhat responsible for this attitude. That they are anything but minor in importance in nutrition is being constantly revealed by research workers in this country and abroad. Some of the comments which follow may be tedious but some things must be said over and over again, in order to have them register in the public mind. This is one of the chores of technical progress and it calls for patience with zeal. In its efforts to expand the use of its products, the fertilizer industry must recognize that its message has to compete with the glamour of new antibiotics, jet engines, sputniks and similar dramatic news. But since its efforts, while being of honest self interest, are nonetheless of national interest, too, it must patiently keep everlastingly at it. Progress in putting the message across to the public has been made and the story of the role of commercial fertilizer in the nation's economy is better known today than a decade ago. Modern means of communication effectively remove much of the tedium of retelling the century-old role of NPK in crop production.

Research "Down-Under"

COMING back to the minor elements: it is noteworthy that research into the role of these elements is outstanding in New Zealand and Australia. Interest in these two countries has focussed on these elements, and their soil scientists have revealed many biological relationships helpful also to investigators in other countries. Typical of New Zealand attitude is this comment by Dr. J. Melville, one of its eminent scientists in grasslands management: ". . . the sound nutrition of plant and grazing animal requires the utilization of no less than 12 different mineral elements, most of which are ignored at present but cannot be neglected indefinitely in fertilizing programs."

And another, Dr. E. W. Russell, internationally known British authority on soils, warned a New Zealand audience recently: "As the carrying capacity of our grasslands is pushed up to higher levels, the trace element position needs to be watched very closely."

The 12 mineral elements referred to by Dr. Melville cannot, like the carbohydrates, be fabricated by plants out of air, rain and sunshine. They must be derived from the soil, and unless they are present and available to the growing plants,—they and the animals depending upon them will suffer. I like the illustration of this mutual biologic dependence as given by Dr. W. A. Albrecht of Missouri. He pictures a pyramid with man at the top and animals, plants, microbes and soil in that order, below him. Man, says Dr. Albrecht "has reveled in the loftiness and authority of that position, but is slowly realizing that it is a more and more hazardous one. It represents the extreme of complexities and numbers to which his foods must be chemically compounded and delivered by the coordinated and consecutive helps from the life forms below him. If they fail him, he suffers deficiencies. He, like his supporting animals cannot synthesize the necessary proteins from the elements. Animal life can only assemble them from the amino acids, provided the necessary kinds and amounts of each of these can be collected from the plants, and the microbes still lower in the biotic pyramid. Thest are the lowly forms by which alone these essentials are created from the simpler elements, including many from the soil."

Examples

THE role of the minor or trace elements in living organisms is complex and not as yet understood completely. Research is being directed increasingly into their vital behavior. Some brief examples may illustrate their essentiality. Consider the case of black wool on sheep which turns gray if copper and cobalt are lacking in the diet. The natural crimp in wool is recognized as a major factor in its quality. The market does not want straight fibered wool. In South Africa, sheep grazing on certain soils developed the offending straight fibred wool and farmers were losing their market. A long, patient research brought out the fact that the herbage on which the sheep grazed lacked copper, and this deficiency starting in the soil, caused the straight fibred wool.

Australia has an area of poor soil called the Ninety Mile Plain, which would grow stunted scrub. Soil scientists were put to work to find out why commercial crops could not be grown. It was found that by adding copper and zinc salts along with superphosphate the area would grow good pasture. About 2 million acres were treated, and this Plain is now divided into farms for sheep raising. A similar example occurred in Flor-

(*Continued on Page* 103)

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TECHNICAL SECTION

A Development in Selective Weed Control

*By R. L. Wain**

THE development of a new type of weed killer, based on entirely different principles from those that have been followed up till now, illustrates once again the debt we owe to fundamental scientific investigation.

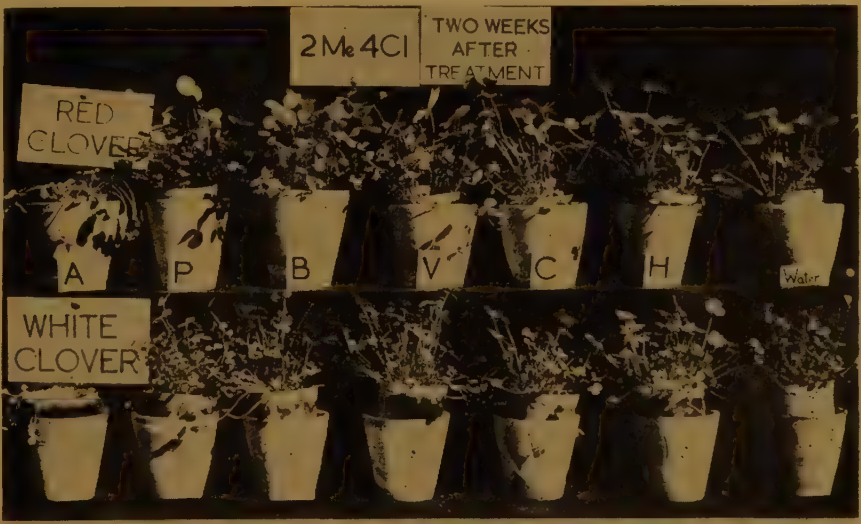
In the course of such investigations over the past twelve years in my laboratory, it has been proved that plants, like animals, can bring about chemical changes in certain fatty acids, and that the enzymes which can cause these changes may be present in one plant and not in another.

It is from these fundamental studies that the new type of systemic weed-killers have been evolved. Earlier forms of selective weed-killer involved the use of materials which were harmful to plant life. They were selective in that they were unlikely to be absorbed through the leaves of some plants, but certain to be taken up rapidly by the foliage of fast-growing weeds.

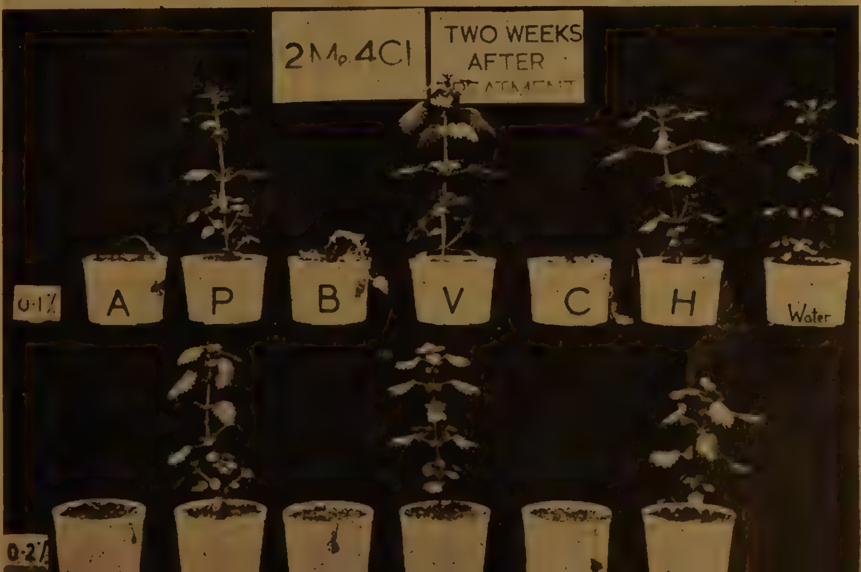
Then came 2,4-D and MCPA—selective "hormone" weed-killers which, in the main, damage broad-leaved plants but leave cereals and grasses practically unharmed.

A series of studies in my laboratory showed that one species of plant treated with an aryloxy-butyric, caproic or octanoic acid, could degrade the compound to the highly-active acetic acid form which acted upon the plant, killing it. Another plant species with a different enzyme structure, would remain unharmed because it did not stimulate the formation of the toxic acetic acid.

Tests were continued along this line, and the results in many cases were spectacular. For example, when annual nettle (*Urtica urens*) and creeping thistle (*Cirsum arvense*) plants were sprayed with 0.1 per cent. solutions of six different highly-complex acids, three solutions killed the plants within three weeks and the remaining three caused no harmful effects. But when clover plants were sprayed with the same six solutions,



(Top) Effect of spraying solutions of 2,methyl-4-chlorophenoxy acetic, propionic, butyric, valeric, caproic and heptanoic acids on red and white clover plants.



(Bottom) Effect of spraying same acids on annual nettle plants.

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*Professor of Agricultural Chemistry in the University of London and Honorary Director of the Agricultural Research Council's Unit on Plant Growth Substances).

only one of the six materials killed the plants.

All these results gave strong support to the idea of a selective weed-killer based on the plants' own enzyme make-up.

Further work was carried out on a wide range of crops and weeds,—and already one compound, commonly known as MCPB, is being used widely by farmers in Britain to control weeds in cereals, clover and peas. Another compound, likely to be marketed as 2,4-DB, is also being developed as a selective herbicide. Both are harmless to plants except when the plants are themselves capable of converting these substances, inside the plant, to the hormone herbicides MCPA and 2,4-D. Since certain important crop plants cannot bring about this change, the materials possess a unique selectivity.

Perhaps the greatest practical value of these two new weed-killers is that they cause practically no damage to clover when applied at the strengths necessary to kill weeds.

It is, therefore, now possible to control certain weeds with safety in cereals undersown with clover, and in grassland where clover is present. The results of trials carried out in Europe and America all emphasize this clover-sparing action, which is such a valuable feature of MCPB and 2,4-DB from an agricultural point of view.

Another advantage of these materials is that they may be used with complete safety on young cereal plants at rates even higher than those required to obtain weed control. Such plants are well known to be susceptible to treatment with MCPA and 2,4-D, which can lead to serious ear distortion in the mature plant.

MCPB can be used to control certain weeds in a number of varieties of peas. Excellent results have been obtained, for example, in removing creeping thistle from the pea-crop, an operation which hitherto could never be carried out with chemicals. Lucerne, whilst susceptible to MCPB, is not seriously affected by 2,4-DB, and this material is now being used widely for controlling weeds in lucerne crops.

Both new preparations are non-poisonous, not expensive to manufacture, and seem to have a promising future in the agricultural chemical field.★★

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Adjuvants With Defoliants

In a series of tests on the chemical defoliation of cotton, Lamar C. Brown of the Crops Research Division, U.S.D.A., in cooperation with the Department of Agronomy, University of Arizona, has studied the effectiveness of adjuvants under several specific plant and environmental conditions. The results of his adjuvant experiments are reported in the *Agronomy Journal*, Vol. 49:563-566, 1957.

Mr. Brown's studies indicate that the use of adjuvants with chemical defoliants increased the amount of leaf fall and rapidity of defoliation under limiting conditions. Under conditions favorable for defoliation, the use of adjuvants with chemical defoliants hastened leaf fall but no significant gain in total leaf fall was evident. The use of adjuvants with defoliants did not retard defoliation in any of the experiments.

A general recommendation such as "use the wetting agent recommended by the manufacturer or distributor" was found to have some merit; e.g., soap chips or washday detergents have not proved practical substitutes for effective adjuvant materials commonly used with commerial defoliants. A suitable adjuvant should be chosen since some materials may clog nozzles and/or cause excessive foam in spray tanks. In fact, some of the disagreement regarding the effectiveness of adjuvants may be due in part to an unwise choice of adjuvant material, it was pointed out.

Researchers Report Plant Nutrition Key to Pest Control

Preliminary experiments by U. S. D. A. scientists indicate the possibility of a correlation between giving plants the nutrients they need for optimum growth and successful control of spider mites attacking such plants.

Mites are easier to kill with malathion on healthy lima bean plants (left) fed enough nitrogen for good growth. They are harder to kill on plants (right) supplied no nitrogen. These are preliminary findings of experiments by researchers of the USDA at Beltsville, Md. to determine the effect of differences in fertilizer on mite susceptibility of plants.

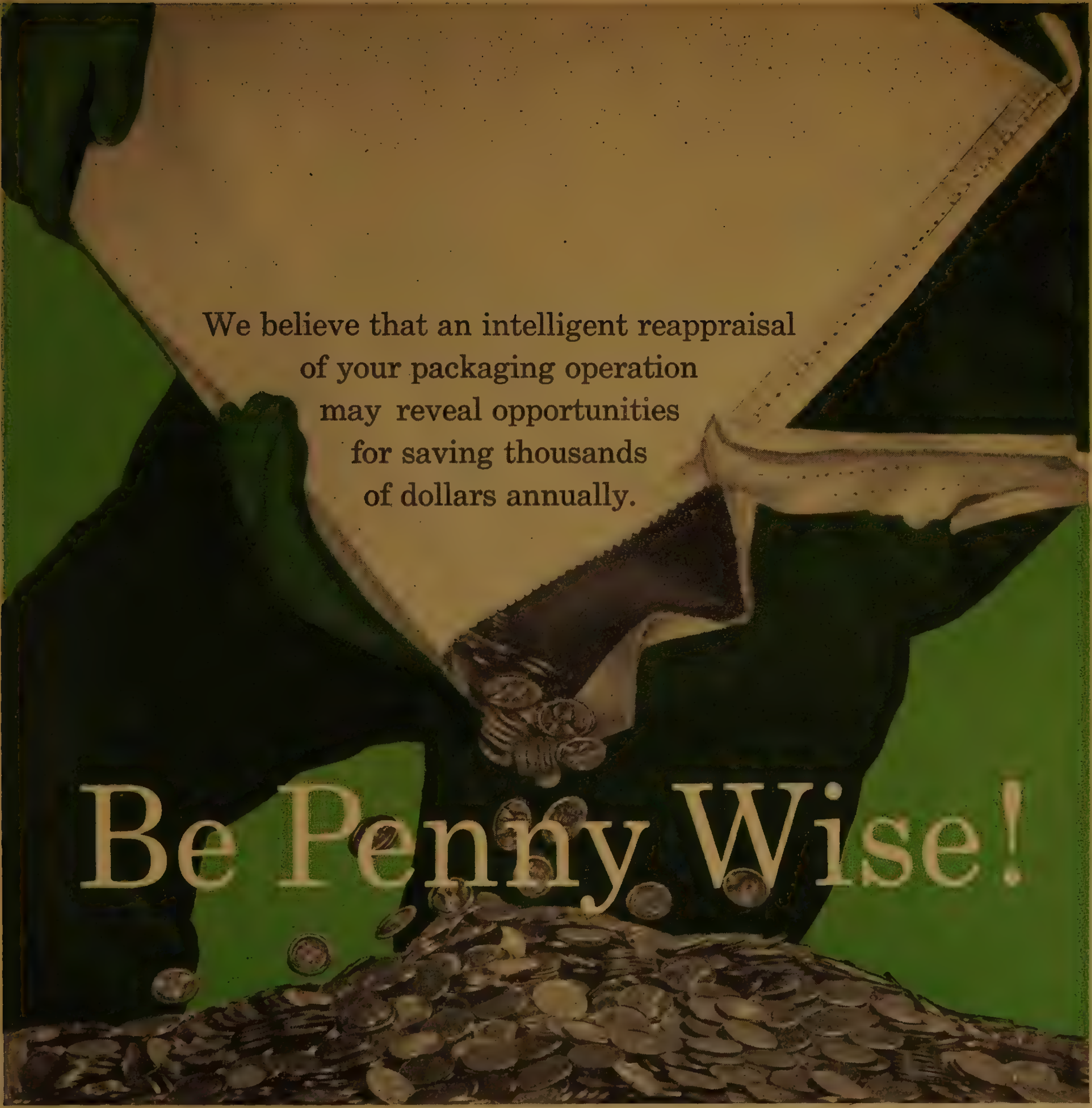
USDA Photo

The USDA scientists found that spider mites attacking pole lima beans were easy to kill with malathion when the beans were supplied with proper amounts of nitrogen, phosphorus and potassium for good growth. But they found mites generally harder to kill on plants receiving either less or more than required amounts of each nutrient.

These experiments were conducted at USDA's Agricultural Research Center, Beltsville, Md., by USDA entomologist Thomas Henneberry and plant physiologist N. W. Stuart.

The experiments indicate that resistance to insecticides noted in insects and mites may actually represent changes in susceptibility caused by variations in plant nutrient levels.

Subsequent experiments may help determine the advantage of timing insect control practices with seasonal variations of nutrients in plants. The continued research may also disclose why susceptibility of mites to an insecticide decreases when nutrient levels are above or below plant requirements. Further work will also include study of the possible effects on mite susceptibility of plant-growth variations produced by variations in light and temperature.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BOOK REVIEWS

Economic Insect and Allied Pests of Delaware, by H. E. Milliron. Published by the University of Delaware Agricultural Experiment Station, Newark, Del. 87 pages.

An interpretation and evaluation of existing conditions in the interest of more adequate protection of crops or crop products. The data presented in this bulletin has been taken from general survey field notes. An annotated list of pests is included for each crop and environmental factors, such as weather, host plants, natural enemies, competition, and soil types, are discussed in detail. Agricultural practices that tend to discourage insect pests are listed for major pests.

More than 300 economic pests are mentioned in the bulletin which meets the need for a suitable insect survey in Delaware that has been felt for some time because of the importance of agriculture in that state. Since 1950, all important crops, except most fruits, have been inspected at regular weekly intervals during the growing seasons. This book is a valuable interpretation of these surveys.

Plant Design and Economics for Chemical Engineers by Max S. Peters. Published by McGraw Hill Book Company, New York. Price $11, 511 pages.

This book is intended to present a comprehensive coverage of economic and design principles as applied in industrial operations and processes. Basic cost data and cost correlations are presented for use in making cost estimates and the essential combination of economic analyses with plant design considerations is emphasized throughout the book. Illustrative examples and sample problems are used to illustrate the applications of the principles to practical situations.

The subject matter and manner of presentation are such that the book should be of value to advanced chemical engineering undergraduates, graduate students, and practicing engineers. Dr. Peters is professor of chemical engineering at the University of Illinois. His book is the latest in the McGraw-Hill Series in Chemical Engineering.

Fundamentals of Soil Science, 3rd Edition, by C. E. Millar, L. M. Turk, and H. D. Foth. Published by John Wiley & Sons, Inc., New York. Price $7.75, 526 pages.

Earlier editions of this book provided a clear exposition of fundamentals for use in a general college course in soils. The third edition brings the subject up to date. Special attention is given to progress made in the basic principles of soil science since the publication of the second edition.

This edition includes more emphasis on soil texture and the concept of the texture profile, more discussion of the influence of soil forming factors on soil development, and more facts about clay minerals to provide a clearer understanding of the differences in the behavior of soils. Primarily a textbook, it can be used as a reference by soil conservation technicians, agricultural agents, and farmers.

A few copies of the 1957 Fertilizer Industry Round Table Proceedings are still available. Copies of the 98-page report may be obtained for $2.50 each from H. L. Marshall, 1604 Walterswood Rd., Baltimore, Md.

Potash Controls Potato Disease

Preliminary results of controlled potash tests on potato crops in California's Kern County have been termed successful by University of California officials in charge of the program.

Effects of potash applications to prevent a type of physiological leaf roll and blackspot or stem end bruising in potatoes have been under study by the University for some time.

Dr. Oscar Lorenz, of the university, announced tentative results at a recent field day held near Bakersfield and attended by approximately 100 representatives of the chemical fertilizer industry, potato farmers and university officials.

Lorenz pointed out, however, the final evaluation would have to await harvesting and marketing of this year's potato crop.

Frank McGrane, agricultural chemicals sales manager for American Potash & Chemical Corporation, said the company was "highly encouraged" by the results reported to date.

The problems of potato stem end blackening and physiological leaf roll are relatively new in this area. However, stem end blackening has been known for many years in Holland where heavy potash applications have corrected the problem. In some areas of the United States, potash has reduced but not eliminated the condition.

Mr. McGrane said a number of railroad cars of Kern County potatoes were rejected at eastern cities last season because of blackspot. He said tests to date indicate potash will cut down on this loss, as well as a type of physiological leaf roll.

Foliage of potato crop near Bakersfield, Calif., is examined during potash tests by Forrest Fullmer, southwest regional agronomist of the American Potash Institute, and Dr. Kent Tyler, of the University of California at Riverside, Calif.

Arcadian News

Volume 3 For Manufacturers of Mixed Fertilizers Number 8

This is the Year to Put More N in N-P-K

TAKE ADVANTAGE OF LOW SOLUTIONS PRICES!

There is a growing demand for a higher nitrogen content in mixed fertilizers. This year, you are in a better position than ever before to supply this demand at a good profit. Nitrogen Solutions are selling at a low price. And the new, improved ARCADIAN® Nitrogen Solutions make it easy and practical to produce high-nitrogen fertilizers in regular mixing equipment.

More Nitrogen from Solutions

Many fertilizer manufacturers are now ammoniating normal superphosphate to a ratio of one unit of N for each two units of P_2O_5 with all the nitrogen from ARCADIAN Nitrogen Solutions. They are able to obtain about half this ratio in triple superphosphate without the use of acids. Where a combination of normal and triple superphosphates is used in formulation, a ratio of one N to two P_2O_5 is easy to obtain by the use of small amounts of sulfuric acid.

This year it will pay you to ammoniate your superphosphate with all the nitrogen it will carry. For example, you may find it profitable to produce 6-12-12 fertilizer rather than 4-12-12 fertilizer. Either of these fertilizers can easily be produced with all the nitrogen from ARCADIAN Nitrogen Solutions.

Low Extra Cost

The only extra cost of the 6-12-12 over the 4-12-12 is the delivered cost of two units of nitrogen in ARCADIAN Nitrogen Solutions. On this basis, it will pay you to figure out how much more profit you can make by producing and selling the higher nitrogen fertilizer. Increasing the nitrogen content of your

(Continued on following page)

(Continued from preceding page)

fertilizer involves proper selection of the Nitrogen Solution that is adapted to your methods, materials, equipment and the formulas you wish to produce. There are Solutions to fit your needs in the big line of ARCADIAN Nitrogen Solutions. Get the advice of a Nitrogen Division, Allied Chemical, technical service man.

He will tell you how to produce high-nitrogen fertilizers with maximum amounts of nitrogen from Nitrogen Solutions, whether you produce pulverized or granulated fertilizers. He is familiar with the techniques involved in producing all grades of mixed fertilizer, including 1-2-2, 1-1-1 and 2-1-1 ratios.

Greater Profits

At the present low price of Nitrogen Solutions, this is an opportune time for you to take advantage of the trend toward higher nitrogen fertilizers. State colleges are recommending more nitrogen in fertilizers. Farmers are more familiar with the benefits of such fertilizers than ever before.

Production of high-nitrogen mixed fertilizers will enable you to supply a bigger share of your customers' total plant food needs with mixed fertilizers. You will be diverting business from straight materials into more profitable mixed fertilizers. Compare your profit per unit of nitrogen in straight materials with your profit per unit of nitrogen in mixed fertilizers.

When you balance your mixed fertilizer with adequate nitrogen to meet crop requirements, you increase the farmer's profit, your dealer's profit and your own profit. You put a greater dollar volume of tonnage through your plant and save money in storage and shipping costs per unit of plant food. You help your dealer to supply the farmer with his plant food needs in a one-sale one-package deal. This builds exclusive customers and repeat sales.

Ask Nitrogen Division

For the 1958-59 fertilizer year, plan now to produce and sell a bigger tonnage of high-nitrogen mixed fertilizers. For technical help on the production of these fertilizers, contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y. This service is available to customers without charge.

For years we have suspected that fertilizer use is related in some way to crop disease and insect problems. USDA tests at Beltsville now show that insects are easier to kill on properly-fertilized plants.

Technical Tips

PUT HEAT TO WORK

for Better Granulation

Many fertilizer manufacturers find that the best granulation is achieved by controlling reaction heat so that the temperature of the mass is higher than 200°F as it leaves the ammoniator. They feel that the results are well worth the extra cost and effort involved. For example, in this method, sulfuric acid—which reacts with about twice as much heat as does superphosphate—is used in much greater quantities than would be required for neutralization alone.

Within practical limits, raising the temperature level brings the mass to granulation with less water content. The earliest point in most granulating processes where heat can be substituted most effectively for water is in the ammoniator. Thus, the ammoniator—in addition to conditioning—can deliver the mass to the dryer at higher temperatures and lower moisture content. This, in turn, lessens the load on the dryer.

Nitrogen Division, Allied Chemical, supplies several nitrogen solutions that raise heat in the ammoniator, as well as several that hold temperatures to the lower levels that some producers prefer. Make your own choice of granulation processes, but be sure to follow time-tested principles that always have resulted in the safe, efficient use of ingredients for higher rates of ammoniation.

Demonstration Sells Pasture Fertilizer

Often a simple demonstration on a small acreage is the best way to convince a farmer that it pays to use plenty of fertilizer. For example, one Indiana farmer is now buying a lot of pasture fertilizer because a fertilizer company agronomist placed a demonstration on the farmer's pasture last spring.

On May 23rd, 100 pounds of nitrogen per acre was spread on a test area of the pasture. By June 20th, the nitrogen top-dressed sod had produced 9½ tons of green feed per acre, containing 3,800 pounds of dry weight averaging 22% protein. His unfertilized grass averaged 4½ tons of green feed per acre, containing 1,800 pounds of dry weight averaging 15% protein.

In one month, an investment of $12 for nitrogen top-dressing produced 2,000 pounds more dry weight and 566 pounds more protein per acre. This big return, within one spring month, sold the farmer on pasture fertilization.

As a result, he tested his soil and now uses complete fertilizer on all of his pasture. With the help of fertilizer, he was able to reduce the size of his pasture from 110 acres down to 80 acres. With fertilizer, the 80 acres now supply 130 head of cattle all the good green feed they can eat. He now estimates that fertilizer will produce two to three extra tons of dry weight per acre for the whole season, in addition to greatly increasing protein content.

Thus a simple demonstration made a good customer out of a farmer who never believed in pasture fertilization until he saw what it would do on his own farm. Demonstrations pay fertilizer men and farmers.

Arcadian News *for Fertilizer Manufacturers . . . . from* **NITROGEN DIVISION**

It Pays to Make Fall a Big Selling Season

If the present trend toward spring and fall use of fertilizer continues, the industry may soon be solidly established on an efficient two-season basis. Producers will be able to apportion production, sales and deliveries over the entire year rather than concentrate on a few hectic months followed by relative inactivity. Aside from the increased tonnage sold, the resultant economies of time and labor cannot help but benefit the fertilizer manufacturer.

In the past, small grains, pastures and vegetables have accounted for most of the fertilizer sold in the fall. But in recent years farmers have been using fall fertilizer on more and more cropland.

The Soil Stores for the Future

Farmers are coming to realize that many soils will hold plant foods over the winter. Retention of phosphorus and potash has always been excellent. And, except for sandy soil in heavy rainfall areas, nitrogen storage in the soil is also practical where winters are cold. In fact, it is becoming commonplace to use high-nitrogen fertilizers for fall plowdown of crop residues, and on sod, cover crops and small grains.

Makes for Better Farming

Virtually every crop can benefit from fall fertilization. Most corn land would be improved by use of fertilizer in fall plowdown. Agronomists even advise fall application of phosphate-potash mixtures on land to be planted in cotton and sugar beets—especially where there is a cover crop. With alfalfa, fall application of fertilizer high in phosphate and potash helps maintain thick stands and contributes to profitable yields. There are also many fruit crops that benefit from fertilization in the late fall.

It is the opinion of experts that fertilizer should be spread on hayland and pasture in the North during late fall, so that plant food will be stored in the roots for an early spring start. The oats, wheat, rye and other grazing crops of the South need heavy fall fertilization to provide pasturage along with a profitable grain crop. In other winter grain areas, using all the fertilizer in the fall produces as big a yield as would be obtained from split or spring application.

Fall, with its dry ground and slack time is the ideal time for spreading fertilizer by truck or some other simple, fast, low-cost method. Conversely, spring, with its labor shortage and pressure of activity is a less favorable time to plow down fertilizer.

Big Future for the Industry

Fall fertilization has been adopted by thousands of leading farmers. News of their excellent results attracts new converts every year, but producers can do much to accelerate the process and reap the bigger profits just over the horizon. Think of the tremendous potential fall market in just the corn, small grains, vegetables, fruit, pasture and hay crops now grown on soil that could use fertilizers in the fall. Get closer to *your* share of it by aggressive promotion of fall fertilizers. Why not start now!

Agronomic Notes

If every field on every farm had a test strip where the crop was fertilized according to experiment station recommendations, your dealers and salesmen would be too busy selling fertilizer to organize a field day.

Lacking this ideal demonstration situation, the tissue test kit still gives your men a graphic way to dramatize the need for fertilizer in any field right now. Quick chemical tests on the tissue of the growing crop show in minutes whether the plant contains enough fertilizer elements for good growth and yield.

True, you'll sell more fertilizer immediately only where the crop can be top-dressed, or where the farmer has an irrigation system. But the tissue test is a vivid reminder. Most farmers who see it use more fertilizer either right away or in the next season.

Almost every farmer has used some fertilizer. A profitable way to translate this fact for action is the saying "using a little fertilizer is like flying on one wing." When we show people the value of fertilizer, we do best by showing the value of plenty of fertilizer.

"Double and nothing" is a good rule to follow in planning fall pasture fertilizer demonstrations right now. If 500 pounds of fertilizer per acre is the recommended amount used on the field, one strip should get 1,000 pounds of fertilizer and one strip should get none.

Heavy rains on the eastern seaboard have leached away much nitrogen and magnesium. Rutgers University reports that up to 75% of the nitrogen and magnesium applied before Easter has disappeared from the fields, and 50% of these nutrients were lost from fertilizer applied up to May 4. They recommended an additional 50 to 75 pounds per acre of nitrogen for potatoes and 25 to 50 pounds for vegetables.

A long-lasting, slowly-soluble form of nitrogen such as ureaform in mixed fertilizers helps prevent such a situation. Mixed fertilizer made with N-dure® solution and urea provides this lasting ureaform nitrogen. Other nitrogen materials provide quickly available plant food. Your mixed fertilizers made with N-dure feed crops well even if heavy rains come so late in the season that side-dressing is impossible.

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When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	26
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6	42.0	19.5	66.3	6.0	8.2	9.3	1.178	10	34
10	44.4	24.5	56.0	10.0	9.5	11.0	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.925	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	—

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WASHINGTON REPORT

By Donald Lerch

THOSE who legislate and execute farm policy here have been saying very little lately about the current farm revolution. Everyone has been too busy cleaning up odds and ends of pending legislation in the rush to make an early closing of this session of Congress.

Nonetheless, farm policy makers here are becoming ever more aware of the tremendous changes taking place in American farming. Most everyone agrees that these farm changes will have a big impact on farming, and on industries which depend upon farmers for their markets or for their sources of supplies.

Small farms are merging into larger units. More farmers are taking up contract farming. In some areas of the South, poor cotton producers are easing their way out of cotton production and into cattle raising and other types of farming.

When you ask what's behind these changes, you get a lot of different answers. The most frequently heard is that capital is being substituted for labor on the farm at a rapid rate. Farm equipment, fertilizers, pesticides are being used to make more efficient use of farm land and farm labor.

Small farms just cannot justify the large capital expenditures needed. Without the machinery and chemicals, they cannot produce as efficiently as their larger neighbors. The result is that the smaller farms are becoming marginal, and have to buy more land or sell out to larger farm operators. The most advanced farm thinkers say that a revolution like this one does not stand still. They expect that many medium size farms of today will be considered marginal in as few as five or ten years from now.

Moreover, as farmers tie up more capital in farm land, farm equipment, and farm production supplies, they seek greater protection for their investments. One of the answers is contract farming. This assures farmers of a definite market at a specified price. Those, who do not like the loss of freedom involved in producing under contract, are seeking other marketing arrangements so they will have a better idea of where they will sell their goods when they are harvested and about what prices they can expect.

Farming is evolving from a way of life into a business. Successful farmers have to become good business managers as well as experts on growing crops. A side result, is the growing number of career opportunities for professional farm managers. One farm leader in the South told us recently that any qualified Agricultural College graduate can walk out of school into a $10,000-a-year farm maangement job in the South today. This may be an exaggeration, but it appears to be the trend.

What do these changes mean to fertilizer and pesticide chemical companies? The specific effects of the farm revolution are so diverse, each company will have to figure out how the changes in its own market areas will affect it. A safe general conclusion voiced by a number of people here is that fertilizer and chemical sales will continue to go up.

The reason is simple. The farm changes are not reducing the total farm acreage. Instead, more farm acreage is being transferred from inefficient farmers to efficient farmers—the ones who have the most education and who use the greatest amounts of agricultural chemicals. Moreover, population continues to expand, and that means more food crops have to be produced on the same acreage. Fertilizers and pesticides will be needed to produce the quality and the high yields needed.

A joker in this situation is that some legislators, at least, admit farm legislation is being fashioned without much regard to the farm revolution. They don't want to expose themselves to the charge that they want to push the smaller farmer out of farming.

* * *

How we stand in the competition with Communism is becoming a topic of daily conversation here in Washington. And it's no surprise to us that agricultural chemicals figure in the competition.

Soviet Premier, Nikita Khrushchev, has warned that he expects Communism to win over Capitalism when Soviet per capita production of meat, milk, and butter surpasses that of the United States.

Taking up the challenge recently, Dr. B. T. Shaw, Administrator of USDA's Agricultural Research Service, pointed out that agricultural science has been the key to helping the American farmer boost his per capita production.

Farmers today are producing 40 percent more from about the same acreage they had in 1939, and fewer farmers are doing the work. Dr. Shaw warned that despite these gains we are still losing too much farm output to pests.

"Every year," he said, "farmers sacrifice almost a fourth of everything they could produce to insects, diseases and weeds."

That puts the Soviet Premier's challenge right at the front door of pesticide chemical manufacturers. To

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a large degree the ability of American farmers to stay ahead in competition with Communist farmers depends upon two factors: the continued flow of new and better pesticides from the laboratories, and more thorough education of American farmers on how to use these products to boost production efficiency.

* * *

The decision of Federal District Judge Walter Bruchhausen in the "DDT Trial" in New York has been greeted with a great deal of satisfaction at the U. S. Department of Agriculture. In effect, Judge Bruchhausen's ruling supports USDA's decision that the Government was well within its rights when it undertook eradication of the gypsy moth in New York State, and that the spraying of DDT would cause no harm to humans, and no significant damage to wildlife.

The plaintiffs in the case appear to be girding their loins for further battle against pesticides. Marjorie Spock, a sparkplug among the plaintiffs, recently informed those who had supported their case that they intend to appeal Judge Bruchhausen's ruling.

Before doing so they might do well to view a full-color documentary film of the gypsy moth eradication program in 1957. The film, produced by Marry Willcox, of Fort Washington, Pa., was recently previewed by USDA. It presents the story of how the gypsy moth spread, the damage it does to trees, and how the pest can be eradicated by aerial spraying. The 22-minute-18-second film called "Gypsy In The Trees" was premiered at the Venice (Italy) Film Festival this year.

* * *

Every now and then something happens to raise our respect for the American way of handling legislation.

A case in point is the wilderness bill. Introduced last year, by Sen. Hubert Humphrey (Minn.), this bill would have turned vast tracts of U. S. forest land into areas where the rule would have been—if a tree falls, let it fall; if insects come let them come; if a man enters, let him leave no trace behind him.

Recent revision of the bill offers many concessions to practical reality, including permission for the President to authorize insect and disease control measures when needed to protect the forest areas from damage or destruction.

The revised bill underscores the fact that more Senators and Congressmen are coming to recognize that insect and disease control are essential to agriculture and forestry.

* * *

Pesticide chemicals are turning up more frequently as the subject of high interest to television farm directors. A recent survey by Jules Renaud, of USDA's Office of Information, disclosed that the most popular TV subjects for farm directors are livestock, *insects*, and soil conservation. Ranking not too far behind are farm production, research results, *disease control*, poultry, and agricultural marketing.

For those interested in the complete listing, third ranking subjects are crop research, Soil Bank, and for-

(*Continued on Page 103*)

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KOLKER Methyl Bromide is packaged in one-pound cans, packed 24 per case for domestic shipment and 48 per case for export.

It is also available in cylinders of 50, 100, 150 and 450 pounds net capacity.

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"International's triple super service

helps us deliver a consistent and

Bagging operation gets down to quick-time at Green Belt. Equipment and operation are arranged for assembly line efficiency. Bags are filled, weighed, conveyed to pallets

Phil Pettitt, Green Belt plant manager, looks over a delivery of International Triple. "We started with IMC triple . . . it ammoniates well, has minimum dust. Always have had excellent results."

Another order of 4-16-16 gets final check-off by Pettitt. Green Belt has warehouse storage for 4000 tons of bagged goods and several hundred tons of bulk product. Special loading docks handle bulk sales.

M. K. MILLER
Pres., Green Belt Fertilizer Co.
St. Paris, Ohio — Bryant, Indiana

"We grew up with International Triple Super. Right from the start IMC worked with us to smooth out production and reduce costs."

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Annual production in each Green Belt plant reaches 15,000 tons. It is available in 8 grade analyses, either bulk or bagged. Both the St. Paris and Bryant operations are identical, featuring overhead conveyor systems and special bulk loading docks.

Bob Miller checks the scales that weigh each formula ingredient. Accuracy here gives quality control, helps Green Belt meet and exceed State requirements for mixed fertilizers.

A peak quality product supported by a full range of soil services is the action plan that keynotes Green Belt growth to a 2 plant operation in only five years.

One popular service is soil testing — with the analysis made right in the Green Belt lab. Covers every test from major to micro elements. It's part of the complete agronomy service that keeps two agronomists and a soil technician really busy supplying recommendations.

With so much expert direction available to farmers, Green Belt makes sure fertilizers perform "as directed" when they suggest a formula to overcome specific fertility problems.

Obviously, ingredient selection is vital. M. K. Miller, president of Green Belt, himself an agronomist, says, "International's coarse triple gives us a consistent and very desirable semi-granulated crisp fertilizer that enables us to serve our customers with a dependable product.

"Important to us also is International's fast delivery system. It pulled us out of a hole when a sudden rush appeared unexpectedly. IMC had cars rolling almost before we finished phoning in the request."

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NEWS about the TRADE

ASAE Meet On Coast

Wesley E. Yates, in charge of the University of California Department of Agricultural Engineering at Davis, told the 51st annual meeting of the American Society of Agricultural Engineers, June 25, that agricultural aviation is an accepted practice and a real necessity in the state of California.

One thousand people attended the meeting at Santa Barbara College. Mr. Yates conducted a tour through an agricultural aircraft display at the Santa Barbara Airport and described the various types of aircraft and equipment used, and the value of the crop dusting industry to the California farmer. The aircraft display was arranged by the Agricultural Aircraft Assn., Fresno, Calif.

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Fertilizer Solns Meeting Nov. 16

The National Fertilizer Solutions Association have announced that the 1958 meeting will be held Nov. 16-18 at the Netherland Hilton Hotel, Cincinnati. Program details will be offered at a later date.

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U.S. Grant For Greek Plant

The United States Government has announced plans to grant $12 million out of the new Development Loan Fund for a nitrogen fertilizer plant in Greece. The plant is estimated to cost $23 million and will take three years to build.

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Potash Miners Strike

A strike in the National Potash Co. mines in Carlsbad, N. Mex., was still in effect late last month. The strike began on July 2 when 150 workers formed picket lines although the company's mines there already were shut down for inventory reduction.

The company is reported to have offered a wage increase of four-cents an hour this year and an additional four-cents an hour next year, plus 20 per cent production bonus on the increase. The union, A.F.L.-C.I.O. United Stone and Allied Products Workers of America, however, calls this inadequate.

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Aerial Applicator Insurance

A group life and hospitalization plan is being offered for the agricultural aircraft industry through the Agricultural Aircraft Association, Chandler Field, Fresno, Calif.

Coverage is available to all members, their employees, and their respective dependents under the plan, which is the first such program ever offered to the industry.

Reschedule Round Table

The dates and meeting place for the 1958 meeting of the Fertilizer Industry Round Table have been changed to avoid conflicts with other meetings. The new dates are November 5, 6, and 7, 1958, at the Mayflower Hotel in Washington, D. C.

The meeting had been scheduled for October 29 to 31, at which time the NAC meeting will be held in Augusta, Ga. Vincent Sauchelli, chairman of the Fertilizer Industry Round Table, has advised persons interested in attending the Round Table to make their hotel reservations promptly.

•

Canadian Group To Meet

The 1958 convention of the Canadian Fertilizer Association will be held from August 20 to 24 at Murray Bay, Quebec.

NAC to Hold Silver Anniversary Meeting in Augusta, Oct. 29-31

THE National Agricultural Chemicals Assn. has released a preliminary program for its silver anniversary meeting to be held at the Bon Air Hotel in Augusta, Ga., Oct. 29, 30, and 31.

A feature of the meeting will be an address by Herman E. Talmadge, Senator from Georgia, who will speak on agricultural progress as related to the pesticide industry.

In addition, the program includes panel discussions on the subjects of public relations and the expansion of future markets. Other talks will be given by NAC president Jackson V. Vernon, vice-president of Food Machinery and Chemical Corp.; John Gillis, vice-president of Monsanto Chemical Co.; and Frank Washburn, general manager of the agricultural division of American Cyanamid Co., New York.

Charles S. Maddock, Hercules Powder Co., will be the moderator of the panel on public relations. Included on the panel will be Dr. Cynthia Westcott, Glen Ridge, N. J.; Phillip Alampi, New Jersey Secretary of Agriculture; and Stephen G. Pugh, Southern Bell Telephone Co.

The panel on new and expanding markets will be comprised of Wilbur J. Garmhausen, Ohio Department of Highways; Dr. Herbert L. Haller, Assistant to Administrator Production Research, ARS, USDA; William Johnson, Union Bag & Paper Co.; and M. W. Melander, Stauffer Chemical Co.

How to obtain safe, positive control of—

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(Fruit Flies)

Whether you prefer to use sprays or powders, be sure they contain dependable, time-tested Pyrenone.*

In canneries, wineries or food processing plants, Pyrenone assures high kill of adult fruit flies . . . prevents them from laying eggs in the broken skins of fresh fruits and vegetables . . . tends to repel new invasions of Drosophila from untreated areas.

This versatile pesticide compound is an exclusive synergized combination of *piperonyl butoxide* and *pyrethrins.*

Both ingredients are highly effective—yet so low in toxicity to human beings that Pyrenone has been cleared by the FDA for post-harvest use on a wide range of nuts, berries, deciduous fruits and vegetables. For safe, positive control of fruit flies wherever fresh produce is in transit or in storage, look for "Pyrenone" on the label—or "*piperonyl butoxide*" and "*pyrethrins.*"

We'll be glad to furnish you with the name and address of your nearest supplier of Pyrenone-based sprays and powders. Contact Fairfield Chemical Division. You'll find convenient branch offices in principal cities.

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Novel Fertilizer Demonstration

New Best Formulation

The Best Fertilizers Co., Oakland, Calif., is demonstrating its new formulation for Best Pelleted Garden and Lawn Fertilizer by spelling the word "Best" with the fertilizer on half a dozen hills in the Northern California area.

The company's 11-8-4 formulation has been augmented by the addition of 23 per cent soil conditioner and other trace elements.

●

Two Join Sulphur Export

Jefferson Lake Sulphur Co., New Orleans, and Duval Sulphur & Potash Co., Houston, Tex., have joined Sulphur Export Corp., New York, to market their sulfur outside of North America.

Sulphur Export was formed last May by Freeport Sulphur Co. and Texas Gulf Sulphur Co., both New York, under the Webb-Pomerene act which permits companies within an industry to join in doing business abroad. Sulphur Export now handles overseas sales for all U.S. producers of sulfur mined by the Frasch process.

●

Named Hoist Sales Manager

John J. Garrity, district sales representative for Yale hoisting equipment in the Detroit area since 1954, has been named hoist district sales manager for Northern California, Northern Nevada, Utah, and Hawaii by the Yale Materials Handling Division, The Yale & Towne Manufacturing Co., Philadelphia. His headquarters are in the Yale manufacturing plant at San Leandro, Calif.

●

Cyanamid Appoints Bennett

John C. Bennett has been appointed sales manager of American Cyanamid Company's Agricultural Division. Mr. Bennett has charge of the field selling organization as it pertains to all areas of agricultural activities. He also is responsible for sales training.

Mr. Bennett has been in charge of Cyanamid's phosphates sales for the past 12 years. During World War II he served as a major in the Chemical Corps of the U. S. Army. He joined Cyanamid on termination of his military assignment in 1946.

Holding Bemis Open Houses

Bemis plants across the nation are marking the 100th anniversary of the Bemis Bro. Bag Co. with "family" open houses. So far, twelve open houses have been held and 14 others are planned.

A typical Bemis Centennial open house features a tour of the plant, special exhibits, souvenirs, and refreshments.

50th APS Meeting At Bloomington, Indiana, August 24th

The 50th anniversary meeting of the American Phytopathological Society will be held August 24 through 28 at Bloomington, Indiana, in conjunction with the American Institute of Biological Sciences.

All meetings are being held on the campus of the University of Indiana in Bloomington.

In a session on the diseases of field crops and vegetables, Eugene C. Tims, Louisiana State University, will tell of some treatments with Vapam and Mylone to pink root infested soil. George H. Lane, Colorado State University, will describe a unique high-pressure field-plot sprayer.

Ray Nelson of Michigan State University will discuss the influence of gibberellic acid on susceptibility of celery to early and late blight. Metabolic studies with the fungal toxin, Victorin will be described by Lawrence K. Krupka, Louisiana State University.

Harley English, University of California, Davis, will discuss physical and chemical methods of reducing phomopsis canker infection in kadota fig trees as a feature of a session on fruit diseases, forest tree diseases, nematology, and antibiotics. The effect of the root-knot nematode on blackeye bean wilt will be reported on by Ivan J. Thomason, University of California, Riverside.

Burrowing nematode population as affected by a number of variables is the topic of a talk to be presented by Julius Feldmesser, U.S.D.A., Orlando, Fla.

A symposium on fungicides will be presided over by L. Gordon Utter, Diamond Alkali Co., Painesville, Ohio. R. H. Wellman, Union Carbide Chemicals Co., New York, will discuss the commercial development of fungicides and Gordon Brandes, Rohm and Haas Co., Philadelphia, will moderate a discussion on the topic.

The evaluation of fungicides will be discussed by a panel consisting of S.E.A. McCallan, Boyce Thompson Institute, who will report on laboratory evaluation; J. M. Hamilton, New York State Agricultural Experiment Station, Geneva, who will tell of greenhouse evaluation; and W. D. Mills, Cornell University, discussing field evaluation.

J. C. Walker, University of Wisconsin, will present a major address at the meeting on the progress and problems in controlling plant diseases by host resistance.

A symposium on the concepts and problems of nematology will be moderated by J. N. Sasser, North Carolina State College. On the panel will be: D. J. Raski, U. of California, Davis; F. G. W. Jones, Rothamsted Experiment Station, Harpened, Herts, England; Gerald Thorne, U. of Wisconsin; M. W. Allen, U. of California; J. R. Christie, U. of Florida; V. G. Perry, U.S.D.A. Madison, Wisc.; and A. L. Taylor, U.S.D.A., Beltsville, Md.

The Society has arranged for a number of subject matter exhibits that have been prepared by individual institutions and by the society for display during the meeting. Paul R. Miller, president of the American Phytopathological Society, will preside over the meeting. Glenn S. Pound is president-elect.

Campau Joines Eli Lilly

Edward J. Campau has joined the plant science department of Eli Lilly and Co.'s Agricultural Research Division at Indianapolis, Ind. He will conduct research in developing and evaluating pesticides.

Prior to joining Eli Lilly, Dr. Campau supervised pesticide research at the Standard Oil Company of Ind. He is a past chairman of the Insecticide Scientific Committee of the Chemical Specialties Manufacturers Association and is an active member of the Entomological Society of America and the American Association for Advancement of Science.

•

Pesticide Not Preservative

The Interstate Commerce Committee of the U. S. House of Representatives has ruled that pesticidal chemicals are not preservatives. In so ruling, the congressmen concur with the thinking of the fresh fruit and vegetable industry.

The committee's views are contained in a bill which it reported last month to amend the definition of the term "chemical preservatives" as used in the Federal Food, Drug, and Cosmetic Act. The lawmakers are of the opinion that it shouldn't be necessary to inform the public of the fact that pesticides may have been sprayed on produce to retard mold bacteria when the residues remaining are not amounts that would be hazardous to health.

Under the terms of the measure reported by the committee, the definition of "chemical preservatives" will not include any pesticide chemicals used in or on any raw agricultural commodity.

The issue of whether a pesticide is a chemical preservative stems from and conflicts with a ruling by the Food and Drug Administration which says that chemicals used prior to harvest need only comply with the requirements of the Miller pesticide law, but chemicals applied after harvest become preservatives.

In its report on the bill, the House Interstate Commerce Committee says that the fresh fruit and vegetable industry has indicated that such a labeling requirement would be impractical. A restriction requiring labeling of agricultural products would be difficult, if not impossible, to enforce, the committee feels, because of the vast scope and complexity of the production and marketing of fresh fruits and vegetables and the multiplicity of pesticidal chemicals that might be used.

•

New Herbicide Limits Drift

A new weed and brush control chemical which limits the possibility of spray drift damage to crops has been placed on the market by the Dow Chemical Co., Midland, Mich. The compound is called Inverton 245—a 2,4,5-T material formulated in an invert emulsion.

The invert emulsion, a dispersion of oil particles through water, gives the spray mixture a thick, creamy consistency. Inverton 245 is best suited to industrial applications such as spraying along roadsides, railroads, or power line rights of way.

. . . in any size from 325 mesh up to ½"

A uniformly produced carrier compatible with both organic phosphates and hydrocarbons

It's Pikes Peak Clay . . . the carrier that is recommended for malathion, methyl parathion, ethyl parathion *and* hydrocarbons . . . compatibility approved by toxicant manufacturers because of exceptionally low moisture content and remarkable pH of 5. In addition, it is highly absorbent, less hygroscopic and has unmatched flowability.

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Whether you are looking for a carrier for concentrates . . . or for adjusting bulk density . . . or fluffing field strength dusts . . . and you want it in granules or ground to 95% through a 325 mesh . . . you will find that Pikes Peak Clay always seems to be "just a little bit better." For proof, write today for samples of Pikes Peak Clay. Or, better still, call GRaceland 7-3071 in Chicago.

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Indiana PCO's Elect Lewis

The summer meeting of the Indiana Pest Control Operator's Association, was held at the Butler University Union Building, Indianapolis, Ind., June 28.

The program included talks by Clifford Haley, who discussed community roach control at Bedford; Lee Truman, discussing the Indiana household poisons act; J. J. Davis, who reported on the International Congress of Pest Control in Vienna Austria; J. V. Osmun, who spoke on the status of entomology and plans for development at Purdue Univ.; and a report by L. A. Hooser and W. H. Kemnitz on the right to work law.

Robert Lewis was elected president, to fill the unexpired term of E. L. Bechko, who resigned recently; Robert Furnish was elected vice president.

Clifford Haley of Bedford, Ind.; and Dwight M. Call of Crawfordville, Ind., were elected to membership.

The next meeting of the pest control group will be held August 23rd at The Hills, west of Purdue. J. J. Davis, Purdue University, Lafayette, Ind., is in charge of reservations.

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Opens Research Service

Dr. George E. Ziegler, who resigned as director of research for Zonolite Co., Chicago, on July 1, has opened an independent physics, patent, and research consulting service at 3020 Grant St., Evanston, Ill.

Consultation in the fields of general and advanced physics, electromechanics, optics, electronics, and the construction industries is provided. Dr. Ziegler remains associated with Zonolite as a research consultant.

•

Named Marketing Director

Arthur P. Kroeger, associate director of marketing for Monsanto Chemical Co.'s Organic Chemicals Division, has been appointed director of marketing for the division.

He succeeds John L. Hammer Jr. who is leaving Monsanto to accept an appointment as assistant to the president of the Mississippi Lime Co., Alton, Ill. Mr. Kroeger joined Monsanto in 1929 and became the division's director of sales in 1953.

•

Unions Plan Merger

The Oil, Chemical & Atomic Workers International Union and the International Chemical Workers Union are to meet this month to discuss merger possibilities. This will be the first concrete discussion of the possible merger of the two unions although the question has been mentioned frequently.

•

Carbide Reassigns Four

The transfer of four technical representatives recently was announced by the Union Carbide Chemicals Co., division of Union Carbide Chemicals Co., division of Union Carbide Corp., New York.

The transfers are; Lory A. Crisorio to the Chicago district; D. Wallace Enright to the Charlotte district; H. Robert Hubbs to the Indianapolis district; and Bernard W. Hurley to the Chicago district.

•

Alfalfa Field Days

The Georgia Plant Food Educational Society sponsored a series of seven alfalfa field days last month to stimulate interest in alfalfa plantings. The field days were held in the Piedmont, Limestone, and Mountain areas of North Georgia.

Included in the programs were talks on the importance of lime, phosphate, potash, and boron in alfalfa production and demonstrations of alfalfa hay crushing equipment.

AP&CC Moves Headquarters

The American Potash & Chemical Corp. has moved its headquarters offices into a newly constructed building at 3000 West Sixth Street in Los Angeles.

The new three-story building was constructed on a lot adjacent to the company's old headquarters building. All of the firm's executive offices are located in the new building.

•

Beltwide Cotton Conf.

Cecil H. Collerette of the National Cotton Council will be chairman of the 1958 Beltwide Cotton Mechanization Conference at Brownsville, Texas, August 12 to 14.

Included on the agenda for the meeting are a tour of a pink bollworm research center in Brownsville and an all-day tour of the U.S. and Mexican sides of the border. A round-up on ground-application equipment for liquid chemicals will include reports on high-clearance rigs, nozzles, and herbicidal equipment. Included on the panel will be E. B. Williamson, Delta Branch Experiment Station, Stoneville, Miss.; Lambert H. Wilkens, Texas Agricultural Experiment Station, College Station; and Carl H. Thomas, Louisiana Agricultural Experiment Station, Baton Rouge.

•

Miller Named By Sunland

Ross S. Miller has been appointed manager of the Kern County (Calif.) division of Sunland Industries, Inc., Fresno, Calif. His headquarters are in Bakersfield. Mr. Miller joined Sunland in 1953.

Union Carbide To Build Near Tarrytown, New York

Construction is expected to start this month on the Union Carbide Chemicals Co. Technical Service Laboratory at Eastview, near Tarrytown, N. Y. The laboratory is expected to be completed by late 1959 or early 1960. The main building, with a total floor area of 85,000 square feet, will house 53 individual laboratory units.

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Systemic Pesticides, Cattle Grub and Lygus Bug Control — Among Highlights of ESA Discussions

APPROXIMATELY 350 entomologists from seven Western states, Hawaii, Canada and Mexico met at El Cortez Hotel, San Diego, California, June 25, 26, 27, 1958, for the 42nd Annual Meeting of the Pacific Branch, Entomological Society of America. Officers for the past year were Chairman, Dr. Laurence S. Jones, USDA, Riverside, Calif.; Chairman-elect, Dr. Leslie M. Smith, University of California Davis, and Secretary-Treasurer, Dr. H. H. Keifer, California Department of Agriculture, Sacramento. Officers for the 1958-1959 period will be Chairman, Dr. Leslie Smith; Chairman elect Dr. H. C. Manis, University of Idaho, Moscow, and Secretary-Treasurer, Dr. Keifer. The two new members elected to the executive committee are Dr. A. E. Michelbacker, University of California, Berkeley, and Harold C. Lewis, Sunkist Growers, Los Angeles. Current membership in the Pacific Branch is 1,113.

Dr. Robert L. Metcalf, Citrus Experiment Station, and President of the Entomological Society of America, told members that killing insect pests is only part of the entomologist's obligation. "Much of the public's suspicion about agricultural chemicals could be avoided if those responsible for applying them were more careful in their choice of pesticides and means of application. Proper regard for public relations is a most essential factor, and adverse publicity such as lawsuits against wide-spread programs give nothing in return but bad publicity. Blanket aircraft applications of pesticides over highly populated areas represents the least selective approach to insect control and should be employed with extreme caution," Dr. Metcalf concluded.

Systemic Insecticides

"The field of systemic materials in Agriculture is a very broad one," Dr. H. T. Reynolds, Citrus Experiment Station, told the group. While work with selenium dates back to 1936, it was not until the fairly recent release of the organic phosphate materials that systemic insecticides came into their own. The length of time residual insecticidal activity remains in the plant is dependent on rate, plant growth and temperature. Seed treatments of alfalfa give protection for 3 to 6 weeks when weather is warm; in cooler weather it may extend to 10 weeks.

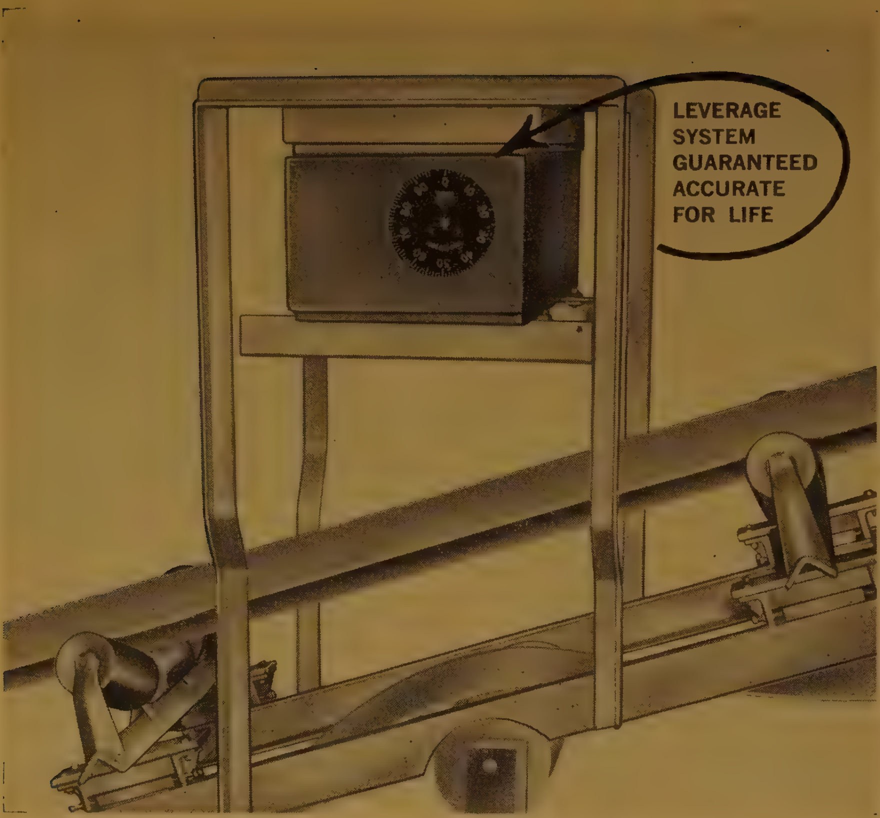
Soil applications have been made using seed treatment, granulars and emulsion concentrate sprays. In all cases results have been similar, but granulars persist a little longer. This method offers great promise, root-applied chemicals are effective against air-inhabiting pests, but not their natural enemies; one treatment lasts a long time, and the chemical is continually translocated and picked up by leaves. It is especially helpful on seedling plants which are most susceptible to injury. Soil applications are also less hazardous and more specific against pest insects. Granular formulations of systemics have multiple uses. When dribbled over sugar beet rows they have given outstanding success. Cabbage transplanted over a band of granules has received excellent protection, but the amount taken up by the plant from side-dress applications of granules was not as great.

"Residues on nursery plants are of no concern, except where food crops may be grown before the chemicals have dissipated," Dr. Charles S. Doucette, USDA, Sumner, Washington stated. "While spray applications of systemics have been widely used, soil applications are most effective and offer the added advantages of safety in use and elimination of inhalation hazards. Soil drenches to potted plants of ornmentals have given better results than foliar sprays. The application of granules to the "drip area" of trees and shrubs, and then watering it in is a method which could readily be used in nurseries. Systemics also offer the possibility of control of certain virus diseases where these are not too widely distributed, and where source plants can be treated. The use of systemics for control of thrips on ornamentals could be of real benefit and merits future study." Dr. Doucette concluded.

"Work with systemics on animals is expensive, hazardous, time-consuming and tedious" Dr. A. W. Lindquist, Bureau of Insects Affecting Man and Animals, Beltsville, Md. stated. Workers at the USDA Orlando, Florida laboratories first found they could control blood sucking pests by internal feeding of chemicals in mid '40s. Application methods attempted include oral drenches, oral bolus; muscular injection; sprays, and inclusion in feeds. Their goal was for a chemical which would be very effective at low dosages against a wide variety of pests, and with a high degree of safety to man and animals. Dow ET 57 (Trolene) is effective against both the Northern and common cattle grubs. One oral application of the proper dose right after heel fly season gives 80 to 100% control. If included in the feed it also gives good control. Bayer 2199 (Co Ral), applied as an over-all body spray is absorbed by the skin, translocated through the body, and is highly effective against both grub species when used at a concentration of .50% to .75%. It also gives protection against screw worm attacks for about 14 days on sheep and goats. Promising newer materials include American Cyanamid 12880 and Dow 109. The search for more effective animal systemics is continuing, Dr. Lindquist stated.

Lygus Bug Control

Correct timing of insecticide applications for control of lygus bugs has increased the yield of dry lima beans by 200 to 250 pounds per acre, according to work done by USDA Entomologists from the Whittier station. One application of DDT just at early blossom, or at intermediate bloom, gave most significant increases in yield. All experimental treatments reduced the percentage of pitted beans caused by lygus bug feeding.



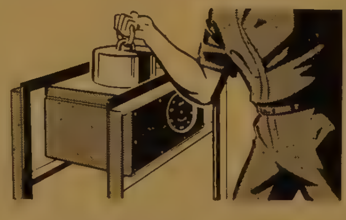
New Totalizing Scale Retains Its High Accuracy

Thayer Inventory Scale fits over any conveyor — continuously weighs material passing thru

A new type continuous inventory scale is being used for refractories, mining, fertilizer batching and other rugged operations where maintenance is usually a problem.

The scale assembly fits over level or inclined conveyors at any desired location. Pneumatic or electro-mechanical controls provide remote reading. The scale weighs the moving belt and material on it, deducting the tare weight of the belt itself. Thayer Scales of 100 lbs. or 300 tons per hour capacity are available.

Exclusive Thayer Plate Leverage System is *guaranteed accurate* for the life of the scale. There are no knife-edge pivots to wear down. Neither dirt nor vibration can affect its high accuracy. Thayer Scales are unsurpassed for reliability under rugged conditions where maintenance is infrequent.



Recalibrate linearly with a direct setting by just placing a known weight on the scale platform. The endless belt is not disturbed. No chains or involved calculations are required. Setting is positive, accurate and long lasting.

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Poultry Pests

Control of Northern fowl mites on hens in community-type wire cages was secured by placing a dust-box containing 4% Malathion dust in the cage. Hens were not left wet nor exposed to the inhalation of dust particles as would happen with present control methods. This work was performed by entomologists from the Citrus Experiment Station, Riverside, Calif.

New Grain Fumigant

Phostoxin, a highly compressed tablet made in Germany, decomposes on exposure to moisture in the air to form hydrogen phosphide. While it has been used commercially in several of the wheat-exporting countries, it has never been used in the United States. Preliminary tests at the Riverside station show it to be effective against such grain-infesting insects as Khapra beetle, confused flour beetle, granary weevil, lesser grain borer and rice weevil. It has excellent penetrating properties. No deleterious effects were noted on wheat germination or flavor after treatment with Phostoxin. Residue studies made by Hazelton Laboratories, Palo Alto, indicate all residues disappear within two weeks after treatment with suggested dosages.

Pesticides VS Honeybees

Studies at Riverside, California were made on toxicity of large-scale field applications of sprays of Dipterex, Parathion, Phosdrin, Thiodan and Trithion to honeybees in alfalfa seed fields. Using Parathion as the standard treatment, Dipterex is the most safe, followed by Thiodan, Trithion and Phosdrin. These last two are about even in toxicity and considerably more safe than Parathion.

Systemics and Biological Control

Dr. Vernon Stern, University of California, Riverside, told the group it is shortsighted to develop a chemical control program for the elimination of a pest species and at the same time ignore the impact of that chemical program on other arthropods, both beneficial and harmful. This approach is no worse than the attempt to depend entirely on biological control to suppress harmful arthropod species, once we recognize that modern agriculture could not exist without the intelligent use of insecticides. Dylox is a relatively non-toxic material to many parasites and predators which help govern population densities of pest species. At the same time it is effective against certain Lepidoptera and plant-feeding Hemiptera attacking field crops in California. When chemical control is necessary, Dylox should aid in maintaining a better balance of the pest-natural enemy population than chemical control measures currently in use.

Photo Salon

The third annual Photo Salon attracted photographic entries from the entire United States and Canada. More than 200 black and white and colored pictures were entered. One entire evening was devoted to showing colored slides and the exhibition of COLOR salon prints. Photographers will have another opportunity to submit pictures at the National meeting of the Entomological Society in December, when the first national salon will be held.★★

Sohio Names Young

William L. Young has been named by the Sohio Chemical Co., Lima, Ohio, as a sales representative for northern Illinois, Iowa, Wisconsin, and Minnesota. He replaces Russel I. Pisle Jr., who now is representing the company in the Ohio area.

Mr. Young has been with Sohio for eight years.

U. S. Rubber Names Three

The United States Rubber Co., New York, has appointed three assistant directors of research and development. Dr. Arthur E. Brooks now directs all research and materials, T. J. Rhodes heads all engineering research, and Dr. D. Lorin Schoene directs liaison between the research and development department and the manufacturing division.

Dr. Schoene formerly was director of research and development for the company's Naugatuck Chemical division.

To Speak At Safety Meeting

W. D. Smith, Southern States Cooperative, Richmond, Va., will be a speaker at the National Safety Council fertilizer meetings, October 21 in Chicago.

Mr. Smith will participate in a panel discussion of accident case histories at the meeting. Others on the panel include: Gaither T. Newman, Smith-Douglass Co., Norfolk, Va.; John S. Mark, Farm Bureau Cooperative Assn., Columbus, Ohio; Stratton M. McCargo, G.L.F., Ithaca, N. Y.; C. K. Brutcher, Davison Chemical Co., New Albany, Ind.; W. A. Stone, Wilson & Toomer Fertilizer Co., Jacksonville, Fla.; and A. I. Raney, Phillips Chemical Co., Bartlesville, Okla.

George Dietz, Fertilizer Manufacturing Cooperative, Inc., Baltimore, is chairman of the Fertilizer Section.

Promotes Taylor

Wyman L. Taylor has been appointed western sales manager, Industrial Chemicals Division, Stauffer Chemical Company, effective July 1st. Mr. Taylor, prior to his promotion, was administrative assistant to the Vice-President, Pacific Coast. He will make his headquarters at San Francisco, and be in charge of Stauffer's industrial chemical sales in the nine western states.

Wilson Meyer Names Four

Wilson & Geo. Meyer & Co., San Francisco, has announced four personnel changes in its agricultural department. Henry Kinsell, sales representative at Fresno, Calif., was named assistant manager of agricultural sales, Southwest territory, Los Angeles.

Delbert Peterson, sales representative at San Francisco, was transferred to Seattle, Wash., to assist with agricultural sales in the Northwest territory. James Stewart Calkins joined the agricultural sales staff in San Francisco where he will handle product sales in Northern California.

Richard Lewis joined the Fresno office of the firm to represent it in the San Joaquin Valley.

O-M Revamps Operating Units

Edwin Block

The Olin Mathieson Chemical Corp., New York, has just completed an integration program which consolidates the company's operating units into seven industrial divisions. Eleven former divisions have been integrated into four new divisions while the Squibb, Winchester-Western and International divisions continue their present organization structure.

The four new divisions and the vice presidents appointed to head them are: Chemicals—Edward Block; Metals—Jess E. Williams; Packaging — Robert H. Evans; and Energy — Carroll Copps.

As head of the new Chemicals division, Mr. Block is in charge of industrial, organic, agricultural and phosphate chemicals operations, formerly independent divisions. He has been vice president in charge of Olin Mathieson's Agricultural and Phosphate Chemicals divisions.

Hooker Adds To Capacity

The Hooker Chemical Corp., Niagara Falls, N. Y., has authorized an expansion of Oldbury brand sodium chlorate production at the company's Columbus, Miss., plant.

To be completed in April, 1959, this will be the third major addition to the plant which began production in late 1954.

FMC Names Two Managers

William A. Kebba has been appointed manager of planning and control for the Inorganic Chemicals Department of the Chemical Divisions of Food Machinery and Chemical Corp., New York. At the same time, Robert H. Malott was named manager of planning and control for the Organic Chemicals department.

Form Spencer International

Spencer Chemical International, Inc., has been formed as a wholly-owned subsidiary for the conduct of foreign trade operations, by the Spencer Chemical Co., Kansas City, Mo. Spencer International was incorporated in the Republic of Panama.

G. Maynard Jenkins, formerly head of Spencer's foreign department, is president of the new firm. J. E. Culpepper and Albert Slingerland are vice presidents. Richard Cahill is secretary and treasurer and E. F. McGill is assistant secretary.

Collier Appoints Two

J. G. Baldwin

R. McGough

R. H. McGough has been named manager of agricultural sales development and J. G. Baldwin was named manager of agricultural chemical sales by the Collier Carbon and Chemical Corp., Los Angeles.

Mr. McGough formerly was manager of agricultural chemical sales and Mr. Baldwin had been manager of industrial chemicals sales.

Sedberry Joins API

Dr. Joseph E. Sedberry, former agronomist with the Louisiana Agricultural Experiment Station and the Monsanto Chemical Co., has joined the American Potash Institute.

Dr. Sedberry will serve as Institute agronomist for the two Carolinas from an office in Raleigh, N. C.

Tells Of Fertilizer Need

With one of the highest population growth rates in Canada, Quebec is losing farms and acreage under cultivation at a faster rate than the national average, according to Paul Bastien, newly-elected president of Quebec Fertilizers Inc. Mr. Bastien made his remarks at a recent conference of the organization at Le Gite, Quebec.

These contrasting trends represent a real challenge to Quebec farmers, he said. In the present situation, Mr. Bastien continued, the opportunity for Quebec farmers is clearly evident. They must make the best use of the remaining land by making it produce more. Nutrients taken from the soil by growing crops must be replaced annually by proper fertilization, he reminded, if yields are to be maintained or increased.

Dr. W. H. Garman, chief agronomist of the National Plant Food Institute, Washington, D. C., told the meeting that the farming industry must become more efficient or it will die.

Agricultural incomes continue to lag behind others, he said. In the U. S. since 1947, farm income has not kept pace with national income and the spread is becoming wider and wider.

Dr. Garman referred to the recent institute study of farming practices in the northeastern United States which showed that the larger, better equipped farms are the heaviest users of fertilizers and the farmers who operate them are better informed on the importance of using soil tests and the proper grade and amount of fertilizer.

An investigation of the Lake St. John area of Quebec revealed that 46 per cent of the land in the area was eroded. To minimize erosion problems Dr. Auguste Scott, head of the soils division of the Agricultural Schools at Ste.-Anne-de-la-Pocatiere, suggested crop rotation and the regular use of chemical and organic fertilizers. He also recommended formation of soil conservation organization.

Mr. Bastien was elected chairman of Quebec Fertilizers Inc.

Fly Production Plant Opens

The Florida Livestock Board and the Animal Disease Eradication Division of U.S.D.A.'s Agricultural Research Service have opened a plant at Sebring, Fla., for the mass rearing and gamma-ray sterilization of screwworm flies.

Flies produced in the plant will be used for the eradication of the screwworm from the southeastern United States. Radioactive cobalt-60 is the source of sterilizing rays used to treat screwworm pupae before they develop into flies.

Named Manager For Swift

Richard H. Woodward has been named manager of the Swift & Co. agricultural chemical division in Atlanta, Ga. He succeeds E. H. Rappe, who now is manager of the company's agricultural chemical division at Columbia, S. C.

Mr. Woodward joined Swift in 1947 and most recently was on the agricultural chemical division staff at the Chicago general office.

NPFI Northeastern Rep.

Merle V. Adams, associate in farm crops, Rutgers University, New Brunswick, N. J., has been named Northeastern Regional representative for the National Plant Food Institute.

In his new position, which becomes effective August 11, Mr. Adams will be associated with Dr. Willard H. Garman, Northeastern regional director, and his office will be in New Brunswick.

Gibberellic Acid Patent

A U. S. patent on gibberellic acid has been granted to Dr. Percy Wragg Brian, Margaret E. Radley, Philip J. Curtis, and George W. Elson, all of Weluyn, England. Dr. Brian and his colleagues received patent No. 2,842,051, which they assigned to Imperial Chemical Industries Ltd. of London.

Following World War II, British scientists began an intensive study of compounds rumored to be a Japanese "secret weapon" for increasing food production, and attempted to make a synthetic version. The chemical was introduced into the U. S. in 1955 when Dr. Brian sent five grams of Gibberellic acid to Dr. John Mitchell of the Beltsville, Md. Station of the U.S.D.A. in exchange for a like amount of "Amo-1618," a compound known to retard plant growth.

Export DDT Prices Up

Prices of technical grade DDT for export have been increased one cent per pound by the Chemicals International Division of Olin Mathieson Chemical Corp., New York.

The increase, applicable to the powder and flake or coarse grind material, was effective July 1.

Guardian Acquires Shield

The Guardian Chemical Corp., Long Island City, N. Y., has acquired controlling interest in Shield Chemical, Ltd., Toronto, Canada, makers of chemicals, horticultural sprays, and disinfectants.

Guardian has granted Shield exclusive license to manufacture and distribute in Canada and the British Commonwealth the products made by Guardian.

Court Upholds Mass Spraying of DDT

Judge Walter Bruchhausen, a Federal judge in Brooklyn, ruled last month that the Federal and State governments had a legal right to spray Long Island areas with DDT from airplanes to cope with the spread of the gypsy moth.

In rejecting an application by fourteen Suffolk and Nassau County residents for a permanent injunction against the practice, Judge Bruchhausen said that the plaintiffs presented no evidence that they or anyone else had been made ill by the spray. The judge said, in addition, that some of the plaintiffs are "so strongly in favor of organic farming . . . that their judgment may be influenced by their leanings."

The spray program was carried out in the spring of 1957, but was not repeated this year.

The residents, headed by Robert Cushman Murphy, a well-known naturalist, said that the spraying had caused considerable loss of birds, fish, bees, and insects. They also charged that the chemical had injured plants and rendered vegetables such as peas and lettuce unfit to eat.

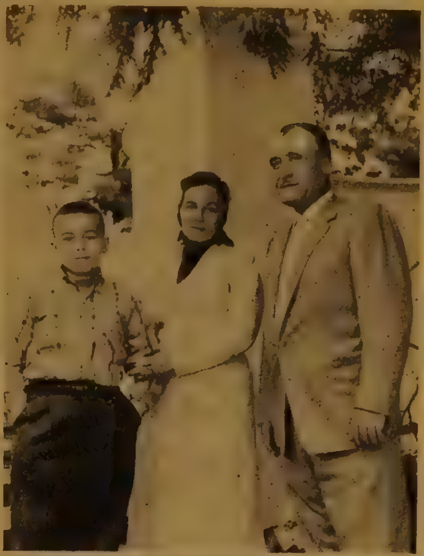
In a 24-page decision Judge Bruchhausen ruled out all of the resident's claims. He asserted also that there was "overwhelming evidence" that the airplane spraying had eradicated the gypsy moth in the Long Island areas.

In analyzing the testimony of medical experts presented by the plaintiffs, Judge Bruchhausen pointed out that their experience with DDT does not seem sufficiently broad and intensive to warrant acceptance of their conclusions. Of Dr. William C. Martin's testimony, the judge said that there is no evidence that he has distinguished between massive doses of DDT or exposure indoors as compared with the spraying of it in a diluted form of one pound per gallon per acre, the solution used in the spray program.

The court said that although Dr. Malcolm M. D. Hargraves of the Mayo Clinic is a physician of long experience, he has not indicated sufficient knowledge of the effects of DDT for acceptance of his opinions. It was pointed out that his opinion was based on what his patients told him about their ailments and not on actual laboratory tests. Judge Bruchhausen said that the symptoms of persons affected by DDT are also symptoms of other diseases and that physicians generally have not become alarmed over the dangers of DDT and similar hydrocarbons.

The judge observed that while Dr. Granville Knight, another witness for the plaintiffs, has read considerable literature and attempted to keep himself informed on the subject, his testimony consisted largely of generalities and was not helpful. In addition, it was pointed out that Dr. Knight conducts an organic farm.

(Continued on Page 94)



FACES IN THE *News*

(Above) Dr. Leslie M. Smith, of the University of California, Davis, named chairman of the Pacific branch, ESA at its recent meeting in San Diego.

Attending the NPFI meeting at the Greenbrier this summer were Mr. and Mrs. Walter Sackett, Sr., of A. J. Sackett & Sons, Baltimore, and a junior member of the family, son Michael.

Also seen at the Greenbier were Mr. and Mrs George Barley, (right) of Diamond R. Fertilizer Co., Winter Garden, Fla.

(At right:) Top officials for the NPFI at the 1958 convention are Paul T. Truitt, who was re-elected executive vice president; L. Dudley George, vice president, Richmond Guano Company, who was named chairman of the board of directors; Richard E. Bennett, president, Farm Fertilizers, Inc., newly elected president of the Institute and Dr. Russell Coleman, re-elected executive vice president.

Sees Need For More Ammonia

The synthetic ammonia industry will have to increase capacity by about 80 per cent to meet farm and industrial demands by 1975, according to R. P. Westerhoff, vice president of the management and engineering consulting firm of Ford, Bacon & Davis, Inc., New York.

Mr. Westerhoff said, in an address before a group of security analysts, that feeding the American people, a booming use for blasting, and lower cost production and transportation techniques add up to the promise of a bright future for ammonia. Existing ammonia capacity, with value of some 500 million dollars, totals about 10 billion pounds a year, he said. In 1955 the chemical fertilizer industry consumed about two-thirds of ammonia production. Mr. Westerhoff said that soil enrichment needs alone could preempt existing ammonia capacity in a few short years.

Named NPFI Representative

John R. Guttay has been named district representative of the National Plant Food Institute, effective September 1, with headquarters at E. Lansing, Michigan. He will cover the states of Indiana, Kentucky, Michigan, and Ohio. Mr. Guttay was with the Michigan Conservation Department before joining the Michigan State University staff in 1951 as a full-time research instructor.

New West Virginia Laboratory

A new multiwall packaging laboratory designed to develop technical improvements in paper shipping sacks is being established at Charleston, S. C., by the West Virginia Pulp and Paper Co., New York.

The laboratory will be operated as a unit of the Multiwall Bag Division recently organized by the company.

Manager of the new laboratory will be Richard P. Kessler, formerly director of packaging research for Arkell and Smiths, whose multiwall operations recently were acquired by West Virginia.

Company officials said that the new laboratory is being located at Charleston because it is the site of the company's kraft mill which manufactures multiwall grades of Clupak stretchable paper.

Kentucky Fertilizer Conf.

The annual Kentucky Fertilizer Conference was held at the experimental field in Greenville, Ky., July 30. Dr. Gilbert Webster, head of the Department of Agronomy at Lexington, discussed the statewide agronomy program for 1958 and placed special emphasis on new and different phases of the program.

Carl Chaplin and Donald Cotter of the Department of Horticulture told how the horticultural program of the University of Kentucky can affect the sale of fertilizer. Tours of the Greenville Experimental Field were held as a part of the conference and the 1959 recommendations of fertilizer ratios and minimum grades were discussed by Harold Miller of the University's Department of Agronomy.

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Spencer Chemical Shifting to Polyethylene Fertilizer Bags

TRANSPARENT polyethylene may soon replace the old time "gunny" sack so often associated with the farm scene. This possibility comes with the announcement that a major producer of farm fertilizer has shifted part of its production from multiwall paper bags into bags made from polyethylene film.

The announcement has been made by Spencer Chemical Company which said that it will package part of its ammonium nitrate fertilizer in 50-pound-capacity bags made from polyethylene film. Spencer is also a basic producer of polyethylene resin at its Orange, Texas Works.

Introduction of the Polyethylene bag for fertilizer could pave the way for putting many bulk products into this new plastic package. Spencer says that its new bags have, after a 2-year development program, proven themselves as highly efficient shipping containers. And, their decision to use the bag commercially indicates a conviction that the polyethylene bag is here to stay.

What the success of the "giant" polyethylene bag as a container could mean in terms of a new resin market can be seen by a look at the Spencer bag. Extruded from 10-mil film, each 50-pound-capacity bag weighs about one-third pound. To make enough bags (40) for a ton of ammonium nitrate, about 13 pounds of polyethylene are required. Ammonium nitrate production in the United States exceeds 1,100,000 *tons* per year—packaging half of this total in polyethylene would account for more than seven million *pounds* of resin production. And, market researchers say that ammonium nitrate is only one of "hundreds" of products which could logically use the bag.

Spencer's new bag is simply a heavy-walled tube of polyethlene film sealed at each end. But, the properties of the film make it one of the most versatile, flexible containers yet devised. What makes the bag so attractive as a container for moisture-sensitive ammonium nitrate is the fact that, inside the waterproof polyethylene bag, the fertilizer can be left out of doors for a considerable period of time without damage. This, as far as the farmer is concerned, is a definite "plus" factor from the standpoint of both storage and convenience.

Another demonstrated advantage of the bag is that it can be reused in a number of ways. The empty bag itself, Spencer says, makes an efficient container for many farm items. When cut open, it provides a 38 by 29-inch sheet of waterproof, weatherproof covering material which can be put to a variety of farm uses.

New fertilizer bags made from heavy-gauge polyethylene are waterproof and can be stacked out of doors when and where it is needed.

In addition to exceptional moisture and contamination protection, the bag is unaffected by corrosive materials. It is transparent enough to allow for easy product identification and inventory. Production-wise the bags have been adapted to standard filling and handling equipment with little difficulty. Shipping history compiled by Spencer using both ammonium nitrate and polyethlene resin to test the bag indicates less breakage than with conventional multiwall bags. Several multiwall bag makers are known to be looking seriously at the potential for polyethylene. Chippewa Plastics, Chippewa Falls, Wisconsin, has been working with Spencer on the development and is currently the major supplier to Spencer and other companies.

In price the new bags are somewhat higher than multiwalls. However, Spencer says that with quantity production "across the board" competition for many applications should not be too far away. One factor which should definitely speed the introduction of the bag for industrial applications is that the moisture, corrosion and contamination protection which it offers enable it to compete for applications where steel and fiber drums are now being used.

Lowe Redding, a Clarksville, Tenn., fertilizer dealer uses a shipment of fertilizer in polyethylene sacks as an emergency wall to protect other bags from the elements.

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Whether your company is at present young or old, thin or fat,—I'll guarantee to pack inches of solid, extra sales into your order book by simple, easy methods of placing your advertising. If *your* order book is puny and chicken chested, chances are you've been abusing your advertising budget.

DON'T ABUSE YOUR BUDGET!

One way an advertising space buyer in the agricultural chemical field abuses his budget is to cut it up in little pieces and scatter it around in every magazine that has the word "chemicals" vaguely connected with it. (You can't hit he-man hard anywhere with small creampuff shots.) Or the advertising buyer gets on the right track and concentrates in one magazine,—but picks the wrong magazine!

MY METHOD—DYNAMIC SPACE BUYING

Pick the one powerful red-blooded magazine in the field — and concentrate your advertising there — where the customers who really count will read your sales messages month after month after month. Repeat calls get the business. And the powerful, red-blooded magazine is easy to judge. Just make a check chart on all the points by which two magazines can be compared:

1. **Most Editorial Material**
2. **Most ABC Paid Circulation**
3. **Most Advertising Acceptance**
4. **Most Readership**
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6. **PRESTIGE**

It only makes sense to concentrate
In the strongest book—AGRICULTURAL CHEMICALS

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(Nothing down and 12 easy payments of only $160 per month)

• A. B. of Two Dot, Mont., writes: "*I added 4¼ inches to my wallet with a concentrated schedule in Agricultural Chemicals.*"

• C.D. of Black Wolf, Neb., writes: *I increased my order department by 2,000 square feet in only 3 months with Agricultural Chemicals.*"

• E. F. of Peapack, N. J., writes: "*A. B. and C. D. are pikers!*"

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Caldwell, New Jersey

☐ Please rush information on the market and the magazine!

☐ Please rush rate card and contract blank!

☐ Please rush salesman!

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International Pest Control Congress At Vienna

By J. J. Davis

UNDER the presidency of Dr. Franz Weiler of Austria, the second International Congress of Pest Control Operators was held in Vienna, Austria, May 14-18, 1958. Dr. Wilhelm Hoos, Germany, president of the First Congress in Helmsted, Germany in 1956, acted as honorary president.

This second Congress was an outstanding success and well planned. Delegates were seated at tables set-up with earphones, translating the reports to German, French and English.

The sessions included five divisions on pest control, as follows: general, public health, wood protection, plant protection and stored products. These included the problems commonly handled by commercial pest control operators in Europe.

Twenty-six countries were represented at the Congress, and the U. S. had 23 delegates. Most of the papers, -all invitational, -were by German and Austrian pest control operators. Two were presented by Americans: "Types of Insurance for Pest Control Operators in the United States," by David Weisburger and "The History and Status of Pest Control in America," by J. J. Davis, Purdue University.

Representatives at the Congress agreed to form an International Union of Pest Control, and a committee was appointed to prepare details.

Among the American representatives were: Wilfred Guim of the National Pest Control Association; Eric Livingston of the California Pest Control Association, and J. J. Davis, representing the Engomological Society of America and the Congress Overseas Committee.

Response To Anhydrous

Dr. Arthur M. Smith, agricultural director and assistant to the vice president, Plant Food Division, Olin Mathieson Chemical Corp., said, in an article in the July-August issue of the *Agricultural Ammonia News* that soil organic matter changes anhydrous ammonia to completely leach-proof organic nitrogen compounds.

Listing some of the hitherto unexplained reasons behind response to anhydrous ammonia in contrast to response to other nitrogen-bearing fertilizers, Dr. Smith said that organic matter absorbs and clay particles adsorb anhydrous ammonia at the time of application . . . both . . . fix and hold ammonia against leaching by rainwater and by solutions of dissolved fertilizer salts."

•

To Speak At Field Day

Richard Bradfield, a Cornell University agronomist, will speak at the annual field day of the Connecticut Agricultural Experiment Station at the Lockwood Experimental Farm of the station in Mt. Carmel, Aug. 16.

Dr. Bradfield will speak on scientific research and the agriculture of the future. He has been on the faculty of Cornell University since 1937 and was head of the Department of Agronomy for 18 years. He served as director of agriculture in the Far East for the Rockefeller Foundation in 1955 and in 1957 he became a trustee of the Foundation.

•

Co-op Memberships Gain

Memberships and average number of memberships in marketing, farm supply, and related service cooperatives have shown marked growth in the past three decades according to the Farmer Cooperative Service of the U. S. Department of Agriculture.

Average membership for each cooperative was 250 in 1926. By 1956, it was 783, or more than three times as many. Total memberships in 1956 exceeded 7.7 million, compared with a total membership of 2.7 million in 1926.

•

Canadians To Hold 6th Meet

Plans for the first Western Canadian conference on agricultural chemicals have been announced by Paul E. Redman, National Grain Company Ltd., conference chairman. Under the auspices of Canadian Agricultural Chemicals Association, the conference will run three days, September 15-17, at the Fort Garry Hotel, Winnipeg.

"The Western Farmer's Dilemma" will be the subject of an address by Professor Clay Gilson of the University of Manitoba on September 16th. Other sessions on the same day will include a symposium on agricultural chemicals and a panel of a manufacturer, distributor and extension worker on problems of the industry as seen from various viewpoints.

"The Petro-Chemical Industry in Western Canada" and "New and Proven Sales and Advertising Techniques Applicable to Agricultural Chemicals" will be featured on September 17th.

The Canadian Agricultural Chemicals Association represents basic producers, formulators and distributors of pesticides in Canada.

IMC Grants To 25 Colleges

The International Minerals & Chemical Corp., has announced that its 1957-58 grant-in-aid program for research in plant nutrition and soil fertility totalled $125,000 to 25 colleges and universities.

IMC-financed studies, under the direction of research scientists in schools receiving aid, were directed chiefly toward fundamental plant physiology and nutrient requirements. The allocation during the fiscal year just ended brings International's total for similar work to more than $1 million in the past 15 years.

Cloaninger Pres. ASFFCO

Bruce Cloaninger, director of the Department of Feed and Fertilizer Inspection and Analysis, Clemson, South Carolina, was elected president of the Association of Southern Feed and Fertilizer Control Officials at the group's 16th annual convention in Atlanta, Ga., June 9 to 11.

Harold H. Hoffman, director of the Feed Laboratory, Tallahassee, Fla., was named vice president. The association announced that its meeting next year will be held in June at Little Rock, Ark.

W. Va. Regional Manager

Arthur T. Severance, head of the commercial analysis group of West Virginia Pulp and Paper Co.'s Merchant Paper Division, has been named regional administration manager of the company's Multiwall Bag Division. Mr. Severance has been with the company since 1951. His headquarters are in New York.

Owens-Illinois Adds To Plant

The capacity of the Owens-Illinois Glass Co.'s Multiwall Bag Division plant at Valdosta, Ga., is being increased with the addition of two new tubers and the necessary supporting bottomers and printing presses.

When the modernization program is completed, the Valdosta plant will be among the best equipped multiwall bag plants in the packaging industry, according to the company. The Valdosta expansion is part of a general program of concentrating production facilities and streamlining operations within the Multiwall Bag Division.

Vanderbilt Adds Two

T. Kugerman J. Nolan

The R. T. Vanderbilt Co. Specialties Department, New York, has announced two appointments to its field sales staff. James Dennis Nolan will cover the midwestern states west of Chicago and Thomas M. Kugeman will cover the midwestern states east of Chicago, and the Province of Ontario.

Sun Oil, Mathieson To Build

Olin Mathieson Chemical Corp., Baltimore, and Sun Oil Co., Philadelphia, have announced plans to form a joint company to build and operate a 73,000 ton-a-year urea plant. The plant will be built at Marcus Hook, Pa., where Sun Oil has a refinery that includes a 300 ton-a-day ammonia plant.

Named Vice President

Frank J. French has been appointed vice president of the General Chemical Division of Allied Chemical Corp., New York. Mr. French is in charge of the division's production, mining, purchasing, and industrial service activities. He has been director of purchases since 1952.

Pacific Northwest Fertilizer Conference Held July 8-10

NUTRIENT studies, economics in using fertilizer, soil and plant studies, highlighted the discussions at the ninth annual Pacific Northwest Fertilizer Conference, held July 8-10, at the Hotel Bannock, Pocatello, Idaho. The meeting was sponsored jointly by the State Agricultural Institutions of Idaho, Oregon, and Washington; and the Soil Improvement Committee of the Pacific Northwest Plant Food Association.

Reviewing residual phosphorus investigation in Oregon, A. S. Hunter, E. N. Hoffman, and J. A. Yungen reported that after a 6-year program of crop rotation,—there was essentially no phosphorus residual from 60 or 120 lbs. P_2O_5 per acre . . . some residual phosphorus remained from a 240 lbs. treatment, but not enough for maximum yield of sugar beets. A 480 lb. rate provided ample phosphorus for all crops in rotation.

Chlorosis studies reported by R. L. Smith, Logan, Utah, indicated that the bicarbonate effects on plants are largely independent of pH and oxygen tension in the root medium. Bicarbonate levels in the root tissue vary with plant species and level in the external medium.

Richard Ohms, Boise, Idaho, observed that high nitrogen and potash applications prolong plant growth and delay maturity in potatoes, which results in low specific gravity and a light skin. High phosphorus rates tend to promote maturity.—And it becomes a matter of nutrient balance and the correct use of fertilizers for maximum yield and quality.

M. G. Klages and C. A. Watson, Montana, noted that in wheat, both phosphate and nitrogen tend to reduce the test weight. Reductions are greatest, they said, where no yield response was obtained.

A brief analysis and summary of the National Plant Food Institute survey on "Farmer's Attitudes Toward the Use of Fertilizer"—in the Western United States, was presented by Delbert Rucker, of the NPFI.

E. Todd Tremblay, northwestern representative of NPFI, presented the Institute program for the Pacific Northwest,—with specific recommendations for the states of Washington, Montana, Oregon, Idaho, and Utah.

Among other suggestions, the Washington group was urged to push fertility research on forest trees; Montana: fertilizer studies on forage crops; Oregon: expand fertility studies on forage crops in the coastal and Willamette Valley areas; Idaho: study possibilities of range and dry-land forage fertilization.

Heads Research Center

Dr. Thomas L. Wilson has been appointed manager of the research center of the United States Rubber Co. in Wayne, N. J. He replaces Dr. Arthur E. Brooks, who recently was appointed an assistant director of the research and development department.

Basic and applied research for all the company's operating divisions is carried on at the Wayne research center. Dr. Wilson joined U. S. Rubber in 1935.

■

Jacob Wins Wiley Award

Kenneth D. Jacob, chief of the Fertilizer Investigations Research Branch, Soil and Water Conservation Research Division, U.S.D.A. has been selected to receive the 1958 Harvey W. Wiley award of the Association of Official Agricultural Chemists.

Mr. Jacob has been conducting studies on phosphate fertilizers since 1919 and was instrumental in the initiation and use of the one-step thermal method of producing available phosphate material from raw phosphate.

■

To Expand At Yazoo City

The Mississippi Chemical Corp., Yazoo City, Miss., has announced that a $2 million expansion program is being started that will provide for the manufacture of solid urea in addition to making available high nitrogen liquid fertilizers for direct application.

The new plant will provide approximately 100 tons a day of solid urea and will increase the company's plant investment at Yazoo City to approximately $20 million.

■

Shifts To Superphosphate

The Central Farmers Fertilizer Co. has switched its production goal at its multi-million dollar Georgetown, Idaho, phosphate plant to triple superphosphate. Central Farmers originally had announced the intention of producing high analysis calcium meta-phosphate at Georgetown.

The company will utilize elemenal phosphorus from a 35,000 kw. elemental phosphorous furnace to manufacture a 105 per cent orthophosphoric acid. This acid then will be used in reaction with acid grade rock to produce a very high analysis triple superphosphate with a P_2O_5 content of between 52 and 53 per cent.

■

Agr. Chemicals Sales Managers

Agricultural Chemicals, Ltd., Port Hope, Ontario, Canada, has named H. R. G. Campbell to be sales manager at London, Ontario, and L. H. Baril at Chambly, Quebec.

Mr. Campbell, who joined Agricultural Chemicals, Ltd. in March of this year, had been general manager of the Orford Farmers Co-op Co., Ltd., Muirkirk, Ontario. Mr. Baril has been with the company for 20 years.

■

Opens Two Branch Plants

Reasor-Hill de Mexico, S.A., a manufacturer of insecticides, has opened two branch plants in Mexico, one at Matamoros, Tamps. and another at Cd. Obregon, Son. The firm's main plant is at Cd. Victoria.

Indiana State Entomologist

John J. Favinger has been named Indiana state entomologist to succeed Frank N. Wallace. Mr. Favinger had been assistant state entomologist since 1942. Mr. Wallace, who resigned March 1, had been state entomologist since 1915.

■

Union Bag Opens Laboratory

The Union Bag-Camp Paper Corp., New York, last month officially opened its new product development laboratory in Hoboken, N. J. The new facilties are devoted to the diagnosis and development of packaging available to industry and provide for the enlargement of research and development activities previously conducted at the company's plant in Hudson Falls, N. Y.

The laboratory houses separate product development sections for the company's different product divisions. The laboratory also provides a center for customer consultation, development work on new products, and new uses for established products.

STRONG, SIFT-PROOF BAG CLOSURES!

for Automatic, Square or Flat Paper Bags

IDEAL FOR THESE PRODUCTS:

Insecticides, Fertilizers, Chemicals, Cement Paints, Wheat Paste, Milk Powder, Dog Foods, Briquets, Corn Meal, Powders and other granular products.

PROVEN PERFORMANCE!

FRY MODEL CSG

EXIT VIEW

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Year after year Berkshire's EMJEO* (80-82% Magnesium Sulphate) and Calcined Brucite (fertilizer grade) 65% MgO have proved to be invaluable primary plant foods—together with nitrogen, phosphorous, and potash.

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Fertilizer To Stop Erosion

At the 51st annual summer meeting of the American Society of Agricultural Engineers in Santa Barbara, Calif., June 22 to 25, J. L. Hosterman, agronomist at Third U. S. Army headquarters in Georgia, said that fertilizer appears to be the most effective device for the control of erosion on military grounds.

He reported successful development of grass covers even on sandy soils of the Southeast, when fertilizers were applied generously. The fertilizer used on military grounds is used primarily to support vegetation for dust and erosion control, to improve sanitary conditions, and to provide an acceptable appearance, he said. Secondary benefits include weed control due to increased density of the ground cover and increased resistance of the vegetation to drought.

•

Nopco Moves To Newark

The Nopco Chemical Co. and its subsidiary, Metasap Chemical Co., has moved its general offices to 60 Park Place, Newark, N. J.

The new headquarters will accommodate the firm's executive, accounting, advertising, and sales departments. The transfer is expected to provide more facilities in Harrison, N. J., the company's former headquarters, for Nopco's expanded laboratory activities.

•

To Manufacture Diluent

The Calcium Carbonate Co., Quincy, Ill., has granted exclusive license to the Victorville Lime Rock Co., Victorville, Calif., for the manufacture and sale of "CCC" Diluent in the far western states.

DDT SPRAY UPHELD

(*Continued from Page 87*)

In commenting on the testimony of witnesses for the defendants, the judge said that he was strongly impressed with testimony offered by Dr. Wayland Hayes because his opinions are supported by actual tests with measured amounts of DDT and by scientific evaluation of the results. Dr. Hayes said that storage of DDT in the human body eventually reaches an equilibrium and that there is no evidence of increase in storage levels over the last few years. Finally, he said, that while DDT may cause illness if ingested in massive doses, there is no danger to health in a spray of one pound per acre.

Judge Bruchhausen cited the testimony of Dr. Frank P. Cleveland who concluded that a spray of one lb. per acre is not deleterious to health.

As to damage to birds, fish, bees, and growing crops by sprays of DDT, the court found that only a few fish and birds were killed in the subject area and evidence of spraying programs throughout the country demonstrates that fish, bird, and bee loss has been inconsequential. In addition, losses are made up by repopulation in a short period of time.

It would seem, Judge Bruchhausen said, that the plaintiffs' major complaint was of annoyance, rather than damage. He recommended that more intensive planning, preparation, and caution should be exercised in connection with spraying a highly developed and built-up section such as Long Island than in spraying woodlands and more isolated areas.

As to the plaintiff's contentions that the mass spraying was not authorized by law, the court said that private rights may be abridged by the exercise of police power and must give way to the public interest, reminding that the rights of individuals are not limitless. Individuals must yield to the requirements of the public as a whole, Judge Bruchhausen ruled.

Accordingly, he said, "I hold that the mass spraying has a reasonable relation to the public objective of combating the evil of the gypsy moth and thus is within the proper exercise of the police power by the designated officials."

Roger Hinds, attorney for the plaintiffs, said that Judge Bruchhausen's refusal to grant a petition halting the spraying will be appealed this month to the U. S. Court of Appeals for the 2nd District in Manhattan. The plaintiffs are expected to say in their appeal that Judge Bruchhausen ignored a stream of testimony about the adverse effects of DDT.

Ecuadorian Pyrethrum Plant

Inexa, Industria Extractora C.A., has been incorporated in Ecuador to establish and operate a plant near Quito for the extraction of Ecuadorean pyrethrum flowers. Dr. Luis Werner Levy is director general of the corporation.

It is expected that the new plant will begin operations in October or November of this year.

The extraction plant will operate a unique process, developed by Dr. Levy, that is said to substantially increase the economic advantages gained by extracting pyrethrum at the point of production. The process is under option to the Mitchell Cotts Group for use in East Africa where commercial production under the new process is expected in the near future.

Award Damages From Drift

A lawsuit in Winnipeg, Manitoba, Canada, for damages resulting from the use of selective herbicides on field crops, resulted in a judgment against the Manitoba Power Commission for $12,138.

The award was made to two market gardeners for alleged destruction of eleven acres of a 1957 crop of turnips and cabbage growing adjacent to a Power Commission right of way.

In its judgment, the court found that the Power Commission failed to inspect the area carefully, that the mixture wasn't prepared under the supervision it should have been given, and that the men who applied the herbicide hadn't been given proper instructions. The product used was 2,4-D ester.

WACA Meeting Oct. 14

The Western Agricultural Chemicals Assn. has announced plans for its annual meeting at the Villa Hotel, San Mateo, Calif., Oct. 14, 15.

The first day will be devoted to a golf tournament and meetings of members and directors.

Speakers for the second day include: Frank C. Lamb, National Canners Assn., speaking on pesticides and the canning industry; Dr. J. M. Merritt, Merck & Co., Inc., who will show movies of gibberellins in action; and Dr. Irvin M. Hall, University of California, who will tell of the microbial control of insects.

An afternoon session will feature talks by Dr. George R. Ferguson, president of Geigy Agricultural Chemicals; E. T. Collinsworth, president of Velsicol Chemical Corp.; and Melvin Goldberg of Pesticide Advisory Service, New York.

Fertilizer Control Meeting

The Association of American Fertilizer Control Officials will hold its 12th annual meeting at the Shoreham Hotel, Washington, D. C., Oct. 17. The States Relations Committee will meet at the same hotel on the preceding evening.

Among the speakers will be Dr. Oris V. Wells, administrator of the Agricultural Marketing Service, USDA; Dr. Woody N. Miley, University of Arkansas; Dr. Vincent Sauchelli, National Plant Food Institute; E. A. Epps Jr., Louisiana Department of Agriculture; and Dr. J. Richard Adams and Walter Scholl of the USDA at Beltsville, Md.

Frontier BHC Price Drops

Frontier Chemical Co., Division of Vulcan Materials Co., Wichita, Kans., has adjusted its price of technical benzene hexachloride to $0.0075 per pound gamma unit, f.o.b., Wichita. The previous price had been $0.00825 per pound.

Probe Herbicide Hazards

Studies conducted by researchers of the Dow Chemical Co., Midland, Mich., into the danger of livestock's being poisoned by grazing on vegetation sprayed with weed or brush control chemicals, have indicated that the herbicides tested do not constitute a hazard.

Working with a combination of 2,4-D and 2,4,5-T, the Dow researchers concluded that such mixtures present no practical hazard when used according to directions. For example, in one formulation tested a cow would have to consume 400 gallons of spray to show symptoms of intoxication. Attempts to determine the lethal dose of Dalapon in cattle failed.

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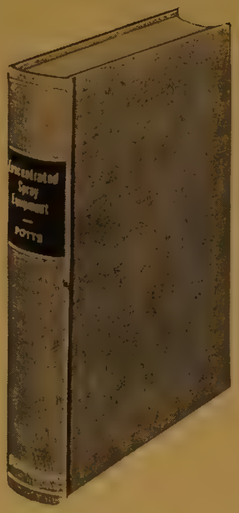

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Samuel Frederick Potts, author of this new book has been in the agricultural chemicals industry for more than 30 years. He has published more than 70 articles, booklets, etc., on various phases of the industry. He has also been instrumental in designing new equipment and improvements in equipment for the application of agricultural chemicals.

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Equipment, Supplies, Bulletins

Belt Conveyor Bag Closer

The Dave Fischbein Co., Minneapolis, Minn., has introduced a belt conveyor sewing unit, the Fischbein Bag Closer, Model B-5.

The entire unit operates from one 110 volt light outlet, with no special wiring necessary. The machine stitches at the rate of 30 feet per minute.

Specifications, literature, and prices for the bag closer are available from the company at 2720 30th Avenue South, Minneapolis.

•

AO Splash-Resistant Goggle

The American Optical Co., Southbridge, Mass., has introduced a new safety goggle for protection against splash, spray, and impact exposures.

The goggle is indirectly ventilated, with no vents in the frame or holes in the lens. The one-piece lens is made of impact-resistant acetate and is said to conform with high safety and optical standards. It is available in clear or green.

•

World Survey Available

A limited number of copies of a World Survey of Pest Control Products, published by the Business and Defense Services Administration, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or through the U. S. Department of Commerce field offices. The price is 60 cents.

•

Compact Packaging Machine

The Jak-Et-Pak-50, a compact and flexible multiple packaging machine designed for broad application of wrap-around multi-unit cartoning, has been introduced by the Boxboard & Folding Carton Division of the Continental Can Co., New York.

The machine has a wide packaging size range and can be used for making combination packs for shipping purposes.

•

Swathmaster Brochure

Transland Aircraft, a division of Hi-Shear Rivet Tool Co., Torrance, Calif., is offering an eight page brochure that describes the new Swathmaster dispensing unit for crop dusting and spraying aircraft.

Fully illustrated, the brochure lists flight and applicating performance for the unit, suitable aircraft, and installation details. The Swathmaster can be used for the aerial application of both dry and liquid materials to farm and forest land. The brochure is available from the company at 2600 W. 247th Street, Torrance.

•

Sevin Information Folder

A folder which outlines the use of Sevin insecticide on beans is available from the Union Carbide Chemicals Co., Division of Union Carbide Corp., New York. The folder points out that Sevin has been effective in tests against major bean pests.

•

Portable Bag Closer

A portable traveling head unit for closing bags while they are on a platform scale has been introduced by the Minneapolis Sewing Machine Co., Minneapolis, Minn.

According to the company, the Minneapolis model TU-8 Traveling Unit will cut bag handling to the barest minimum. One operator can fill, weigh, and sew without moving the bag or changing his position. Having a vertical adjustment of three feet, the machine can be raised or lowered to close any size bag.

Baughman Chain Discharge

The Baughman Manufacturing Co.'s K-5 Lime and Fertilizer Spreader Body now features a lubrication-impregnated drag chain discharge designed to resist corrosion and eliminate "freezing" of the body's automatic discharge system.

Baughman employs a special process to saturate the heavy, malleable block chain discharge with a permanent lubricating agent.

•

Colloidal Adjuvant Info.

The Colloidal Products Corp., Sausalito, Calif., has announced the origination of "Adjuvant Activity," an information sheet concerned with developments in the proper use and function of agricultural spray adjuvants.

In the interest of eliminating any confusion that exists from the terminology currently used in the field with such terms as wetting agent, surfactant, surface active agent, spreader, deposit builder, activator, additive, and detergent, Colloidal is suggesting the word "adjuvant" as a suitable term to cover all these agents.

•

New Mike Aircraft

Michele Aircraft Corp., Washington, D. C., is offering a helicopter-type aircraft, called the "Mike," that is priced at less than $10,000.

The craft has a 100 m.p.h. cruising speed and a 300-mile range. Among many other claims, it is advertised as being excellent for crop spraying and dusting.

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Niagara Adopts Containers

The Jones & Laughlin Steel Corp., Pittsburgh, has announced that the Niagara Chemical Division of Food Machinery & Chemical Corp., Middleport, N. Y., has adopted containers with pigmented phenolic linings for its liquid insecticides, fungicides, and herbicides.

Niagara reportedly adopted the new containers to eliminate any possibility of leakage and contamination of products because of corrosion in pails.

•

TVA Anniversary Report

The Tennessee Valley Authority has published a report to the nation on its first 25 years. The report is contained in a 20-page, illustrated magazine that traces the history of the TVA and lists plans for the future.

Created in 1933 as an experiment, TVA today is a $2 billion concern. Among the projects listed for the future is the reforesting of an estimated 2.7 million acres of forestland and a thorough program of research and education in soil-plant-fertilizer relationships in the interest of farmers.

•

Tape-Over-Seam Bag Closer

The Union Special Machine Co., Chicago, has developed a method of closing tops of multiwall bags with a "tape-over-seam" closure. The closure is produced by the company's machine 80600 HZ which has been specially designed for automatically applying pressure sensitive, self-adhering tape in conjunction with the sewed closure.

The tape is sealed over the line of stitching by the pressure of the presser foot. An automatic trimming device clips off the tape at each end of the closure. Details are available from the company at Dept. B9, 400 N. Franklin St., Chicago 10.

•

Farquhar Conveyor Folder

A new two-color, illustrated folder on the complete line of Oliver-Farquhar power belt and gravity conveyors is being offered by the Conveyor Department, A. B. Farquhar Division, The Oliver Corp., York, Pa.

Included in the pocket-size folder are basic specification details on nine different types of package handling and bulk handling power belt conveyors. Typical installations are illustrated. Booklet available from the company, 44 N. Duke St., York, Pa.

•

Schaffer Poidometer Folder

The Schaffer Poidometer Co., Pittsburgh, has prepared a bulletin describing its weighing and feeding machine that proportions pulverized, granular, or crushed materials.

The Poidometer is self-contained and mounted on a heavy steel channel frame. Standard equipment on the machine includes motor drive, a recording device that shows the amount of material delivered in any specified time, and an automatic control gate which stops the Poidometer when the material supply in the hopper becomes too low. The bulletin, No. 100-55, is available from the company at 2828 Smallman St., Pittsburgh.

Insect Resistance Report

Dr. Raimon L. Beard, entomologist and authority on insect physiology at the Connecticut Agricultural Experiment Station, New Haven, has conducted experiments on the development of insect resistance to insecticides that are reported in Bulletin 611 of the station.

The bulletin covers two and one-half years of research into how the insects change to become resistant to new chemical combinations. Available from the station at Box 1106, New Haven 4, the booklet contains no how-to-do-it information for farmers or gardeners.

•

Plastic Fertilizer Spout

The Plastic and Latex Division of the Minnesota Rubber Co., Minneapolis, has developed a new spout for fertilizer attachments on grain drills.

Designed to replace cast aluminum spouts presently in use, the new spouts are made of a rigid polyvinyl chloride plastic material. They are corrosion resistant.

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Soil Fumigation Brochure

Stauffer Chemical Co., New York, has prepared an illustrated brochure describing the most effective methods of application that have been developed by the firm's field studies of the soil fumigant, Vapam.

The advantages of soil fumigation in nurseries, orchard sites, vegetable acreage, and plant beds are discussed and photographic descriptions of application techniques are included. The booklet is available from the company at 380 Madison Avenue, New York 17.

•

New Globe Livestock Spray

Globe Laboratories, Fort Worth, Texas, has added "Tabutrex" to its dairy cattle, barn, and livestock spray to repel horse flies, stable flies, horn flies, house flies, mosquitoes, and gnats.

The spray also contains pyrethrins and di-n-butyl succinate in a petroleum hydrocarbon base.

•

Yale Improves Lift-Truck Cab

An operators cab with ample room for comfort that offers full visibility has been introduced by the Yale Materials Handling Division, The Yale & Towne Manufacturing Co., Philadelphia, as optional equipment on its line of gasoline powered lift trucks.

With the exception of the window panels, the whole Yale G-3 cab is of steel construction mounted in rubber.

•

Munson Mixer Specifications

A four-page specification sheet on several models of rotary batch mixers, that will mix materials of varying specific gravities and minute or trace quantities, has been prepared by the Munson Mill Machinery Co., Utica, N. Y.

The folder contains charts of mixers showing mixing capacities in cubic feet and notes that many mixing styles are available.

•

Fire Ant Control Booklet

A booklet on the control of the imported fire ant and the cut-ant with Pestmaster Soil Fumigant-1 has been prepared by the Michigan Chemical Corp., Saint Louis, Mich.

Directions are given for the use of the soil fumigant as a simple but quick method of control. The fumigant, containing methyl bromide, is contained in an aerosol can and is applied through a tube inserted into the fire ant or cut-ant mound.

•

Stored Grain Protectant

The Miller Chemical and Fertilizer Corp., Baltimore, has announced that it has developed a new protectant for corn, wheat, and other grains in storage. The new product is available in two forms; dust or spray.

Miller Grain Protectant Dust contains premium grade malathion and is formulated on a flour base. It can be mixed with grain at the time it is stored or it can be applied to the surface of grain after it is in storage. The spray is a concentrate, also containing premium malathion. It is mixed with water and applied in the same manner as the dust. In addition, the liquid spray can be used as a residual treatment in grain bins before storage areas are filled.

•

Trolene Available In '58

Trolene, a new systemic insecticide for cattle grub control, is now avialable nationally, according to the Dow Chemical Co., Midland, Mich. The material is being made available by Dow through the usual outlets for animal health products.

Trolene was placed on sale in South Dakota, Iowa, Nebraska, and Wyoming and parts of Canada, in a trial marketing program last fall. Reported results of the program show an average of 90 per cent control of grub infestations from the use of the compound under actual field conditions.

HANDBOOK OF

INSECTICIDE DUST DILUENTS AND CARRIERS

THE original publication "Properties and Commercial Sources of Insecticide Dust Diluents and Carriers" prepared by T. C. Watkins and L. B. Norton of Cornell University has been brought up to date and completely revised by Drs. Weidhaas and Brann. The new edition contains commercial information as well as data obtained in research conducted at Cornell University, Ithaca, New York.

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WASHINGTON REPORT

(*From Page* 73)

estry. Fourth choices are foreign trade, farm credit, co-ops, and rural electrification. This suggests that farmers today are more anxious than ever before to learn more about insect and disease control.★★

News Brevities

WAYNE P. DEAN has been named agricultural plant food marketing manager of Swift & Co.'s Agricultural Chemical Division.

AC

THE FARM CHEMICAL CORP., Bay St. Louis, Miss., has been granted a charter of incorporation. The firm will manufacture fertilizers.

AC

TWO APPOINTMENTS in the purchasing department of International Minerals & Chemical Corp. have named Chester F. Teeple director of purchasing, and S. Arthur Fournier purchasing agent in charge of central buying.

AC

YALE & TOWNE Manufacturing Co., Philadelphia, has named Edward A. Toomey as manager of the company's Forrest City, Ark., manufacturing plant. He succeeds R. A. Dusseau, who has been named assistant to G. Chapman, Yale & Towne president.

AC

FRANK S. WALTERS, production superintendent in the Plant Food Division of International Minerals & Chemical Corp., Skokie, Ill., has been awarded the company's 45-year merit pin. Mr. Walters joined IMC as a clerk in East Point, Ga., in 1913.

AC

LEO T. RYAN has been named general sales manager for the Vulcan Steel Container Co., Birmingham, Ala. Mr. Ryan's headquarters will be in Birmingham. Vulcan manufactures a line of steel pails and drums in sizes ranging from one to 65 gallons.

THE 46TH ANNUAL National Safety Congress and Exposition will be held in Chicago, Oct. 20 to 24, in the Hamilton Hotel.

FERTILIZER VIEWS

(*Continued from Page* 61)

ida, where at present an area of 15,000 acres of mineral soil in the Everglades, formerly abandoned because of the many failures to establish pasture and raise cattle on it, now flourishes thanks to the application of copper and cobalt elements to the soil together with the major elements. But it was the treatment with the trace elements first which changed failure to success.

A recent report from Connecticut shows that the occurrence of "bitter pit" or "spot" in the Baldwin apple grown in that state was due to deficiency of calcium which resulted in an unbalanced condition between calcium, magnesium and potassium.

It has been suggested that trace elements are tools used by the plant's metabolic process with which to build proteins and carbohydrates.

They are an essential part of the enzyme patterns which catalyze the vital processes. Magnesium in chlorophyll; cobalt in the B12 enzyme of the rumen; iron in the blood corpuscles; calcium in the skeleton—these are a few of the host of examples that could be cited regarding the essentiality of these other than the major elements in vital functions.

Trace elements, you see, are far from being minor in importance. Fertilizer men should interest themselves in the functions of these essential components of living tissues. Selling fertilizers becomes a much more fascinating job as a consequence.★★

Handbook of Agricultural Pest Control

By **S. F. Bailey and L. M. Smith**

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The National Carbon Co., division of Union Carbide Corp., New York, has established two field sales divisions with head quarters in New York and Chicago. E. S. Malkin has been named eastern division manager and J. F. Brauning is western division manager.

AC

The Ninth Annual American Institute of Biological Sciences Meeting for biological societies will be held in Indiana University, Bloomington, August 24 to 28.

AC

Larry L. Casey, an agriculture student at the University of Illinois, was selected as a 1958 winner of the National Plant Food Institute's "Best Agronomy Junior" award. The award is based on scholarship, leadership, and activities.

EDITORIALS

(From Page 27)

its attempt to define the term "chemical preservative" as used in the Federal Food, Drug and Cosmetic Act. Their decision apparently conflicts with a ruling of the Food and Drug Administration which would classify pesticides as preservatives if used on fruits and vegetables following harvest and thus would require cautionary labeling of fresh produce so treated.

Such labeling of fresh fruits and vegetables, the committee decided, "is not necessary to public health, since the pesticide chemicals used . . . within the tolerances established . . . may be considered as harmless." Such a labeling requirement, they believe, "might well disrupt and impede the entire marketing processes for fresh produce, causing hardships to producers. . . . Buyer resistance would result in making fresh produce less available to consumers and would prove to be a detriment to the nutrition and health of the nation."

The committee's views and action are to be commended, and consumers of fresh foodstuffs, producers of the same, as well as those charged with protection of produce against insect attack, can all join in hoping for early passage of HR 9521 which contains the committee's amended definition of chemical preservatives.

CORROSION PREVENTION

(From Page 51)

ing in the machine and this should be tackled by design as well as the use of resistant materials.

Proofing generally is valuable on all small equipment and on any large equipment that also happens to be used for only small amounts of work. On these two, depreciation costs per acre are high and the extra cost of corrosion prevention usually is more than counterbalanced by the increased life. Cost of the machine per acre thus usually comes down.

Proofing is quite essential for a contractor whose machinery depreciation costs per acre are usually insignificant and for whom delays or actual breakdowns represent a high cost.

Extra corrosion proofing is required for most high duty components—those subject to erosion of corrosion-resistant films such as nozzles and pumps and fitter bodies—which become irreparably fixed and useless either through corrosion or congealed pesticide.★★

PHILIPPINES

(From Page 39)

area from more than 50 per cent to less than two per cent.

American technicians have been working with Philippine agencies on research and control methods for the past several years and actual demonstration work has been carried out on almost 6,000 farms in the past two years. Their big problem now is to get the budget to train more men to carry the know-how to the republic's 17,500,000 farm people.

The agricultural budget has been increased somewhat to aid the program and, in the past five years, the United States has furnished approximately $312,000 worth of chemicals and equipment not readily available in the Philippines.★★

LIQUID FERTILIZER

(From Page 29)

When fertilizing orchards, the advantage in using liquids is that the fertilizer can be applied closer to the trees. This also holds true for such crops as blueberries. Small trucks carrying pumps or simple gravity kits and a tank of liquid fertilizer can put the fertilizer quite close to the base of the plant.

A major factor in Mr. Vasta's favor in Swedesboro is that liquid fertilizer can be sprayed on asparagus after emergencies as well as before with no ill effects. Mr. Vasta feels that farmers should not worry about starter fertilizers but should use straight liquid fertilizers to start a plant and to keep it going. He does believe, however, that the placement of the fertilizer is very important. For most crops, it should not be used as a foliage spray, but should be injected into the soil.

Mr. Vasta got into the liquid fertilizer business in 1957. It is presently a sideline to the Vasta family's produce business which was started in 1943. The fertilizer plant is attached to the Vasta Lumber Yard. They still do a considerable lumber, produce, and hardware business, but hope eventually to be in position to concentrate more heavily on the liquid fertilizer enterprise, as soon as some competition shows up.★★

B & L FARMS

(From Page 49)

yields and to raise grade quality through insect control.

The magnitude of the B & L spraying program is best illustrated by the fact that they may spray a tomato crop from 18 to 22 times. Generally, the spraying is done at five-day intervals.

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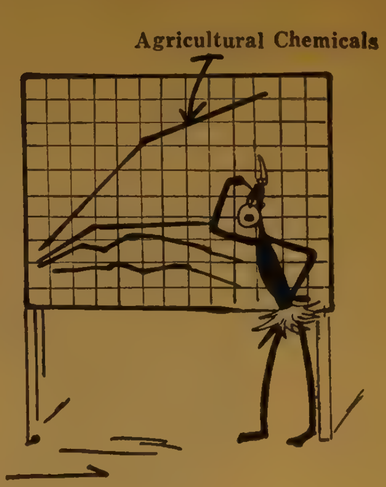

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TALE ENDS

ABOUT this time of the year we are usually making our reservations and looking forward to the annual N.A.C.A. convention at Spring Lake, N. J., the first week in September. We'll miss it this year, and so will others in the industry, we imagine. And as the years retreat in memory, nostalgia will gild the ancient timbers of the Essex and Sussex, we'll forget the sand in the bathtub, the musty aroma of salt-saturated fabrics, the "summer hotel" breakfast schedule, and be clamoring to get back there again for another convention at the Jersey shore. Meanwhile, better make your reservations now for the Bon Aire in Augusta, Ga., October 29-31, if you haven't already done so.

AC

It looks as if the African pyrethrum producers will shortly be ready to announce the name of the new agent to represent them in the United States in the future on sale of pyrethrum. The word is out, as we go to press with this issue, but we have been sworn to secrecy until the formal announcement is released. Present formulators of pyrethrum will continue to handle direct sales contacts with end users. These sales agencies include the firms that have so long been identified with pyrethrum in the United States: Penick, Powell, Prentiss, MGK and Fairfield. Early in September Norman Hardy, executive officer of the Pyrethrum Board of Kenya, will visit the United States, accompanied by another member of the board to supervise setting up the new program.

AC

Do Green plants grow in the dark? This question is answered in the negative in a recent bulletin from Evans Research & Development Corp., New York. Even though plants readily take up carbon compounds and respire in complete darkness, normal growth does not take place. And the same bulletin answers the question, "why do plants bend toward the light?" The bending, says Norman Lazaroff, research project leader for Evans, is caused by more growth on the dark side than on the light side of the plant. For copies of this very interesting booklet, address Evans Research at 250 E. 43rd St., New York.

AC

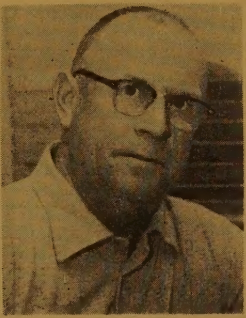
Apparently some overenthusiastic claims are still being made for liquid fertilizers. Curtis Overdahl, extension soils specialist at the University of Minnesota, reports that there have been several reports from the Minnesota farm country recently of super-fantastic results from liquid fertilizer applications. He reminds once more that a pound of actual plant food in liquid form represents no more actual fertilizer than a pound in a dry mixture, and often costs, on a pound-for-pound basis, more than the equivalent fertilizer in dry form. Again we repeat: There is no reason to handicap a good product like liquid fertilizer by hitching "miracle" claims to it which it can't possbly live up to.

AC

Fertilizer promotion films were seen last year by almost 300,000 people, this program being part of the concerted and sustained effort by the National Plant Food Institute to keep expanding the market for fertilizer.

AC

One of our vacationing staff representatives reports a pleasant visit with Grub Leonard during a recent trip to Sarasota. Grub has a beautiful spot on Bay Island, complete with tropical garden and mooring for his cabin cruiser in the back yard. What with so many other retired tycoons of the insecticide industry living nearby—and the weekly parade of visitors from the north—Grub has enough talent on hand at all times for an NACA quorum.



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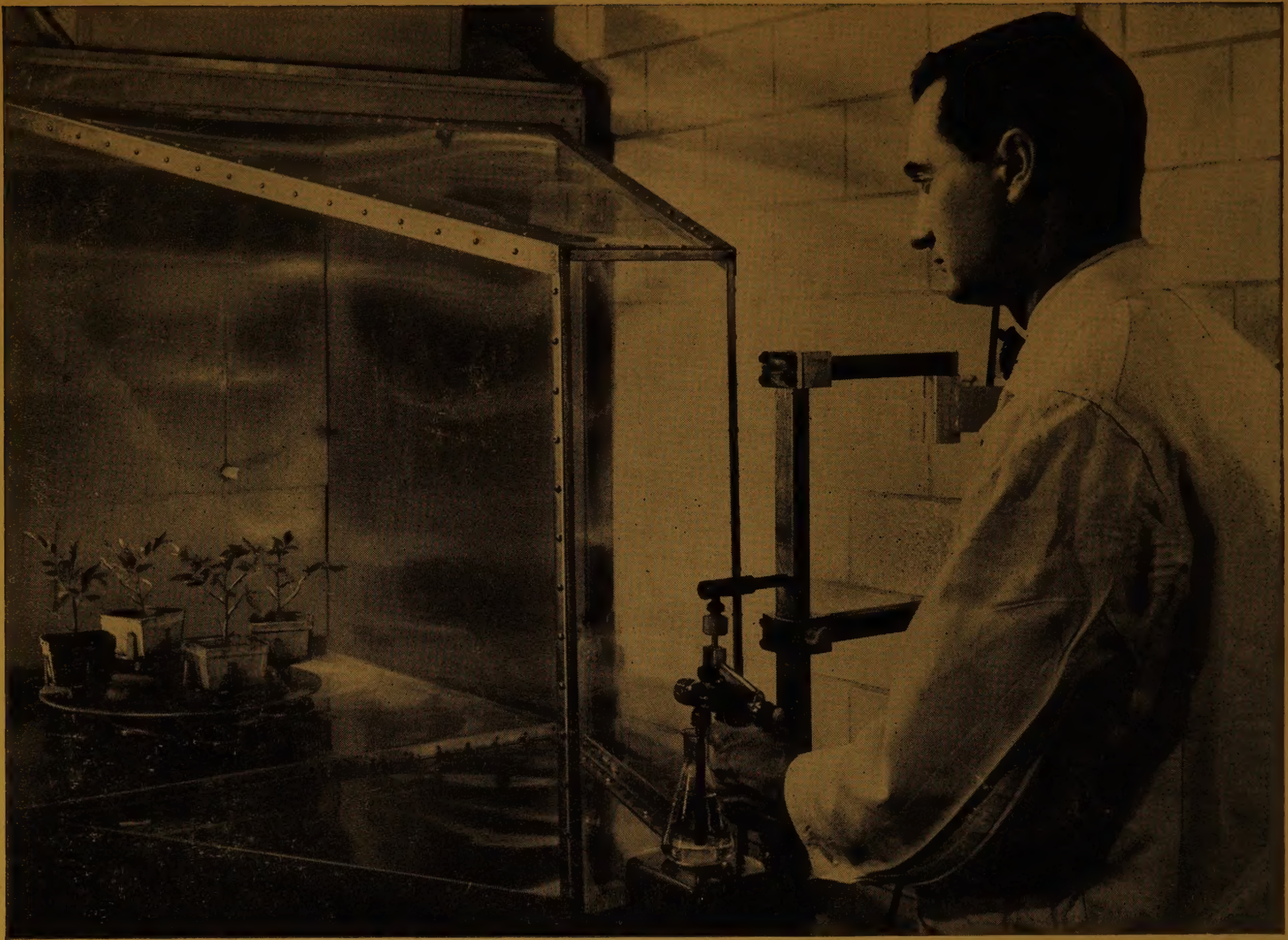

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